School Shop

vol. XXI no. 1

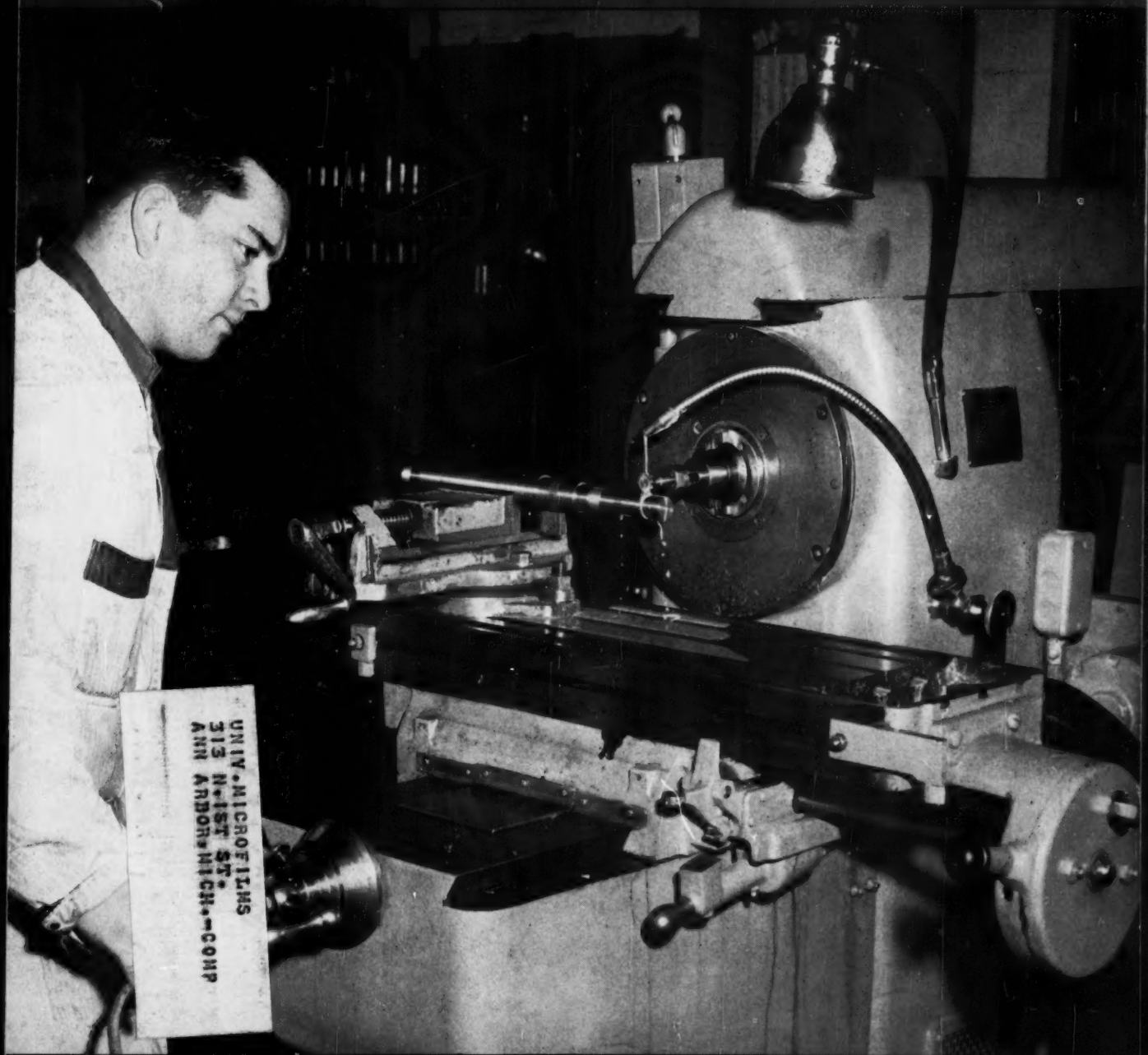
SEPTEMBER 1961

The Professional Objectives of the I-A Teacher
by H. H. London

Power Mechanics Blasts Off!
by Harold T. Glenn

Explosive Metalforming
by Leigh F. Croskrey

Cover Story: Ours is a highly technical age. Robert Glagolia, student at Mergenthaler Vocational-Technical High School, Baltimore, Md., typifies what is necessary to prepare our youth for the tools and technology they will inherit. For a discussion of educational objectives for our age and how to achieve them, turn to page 15 for a report.



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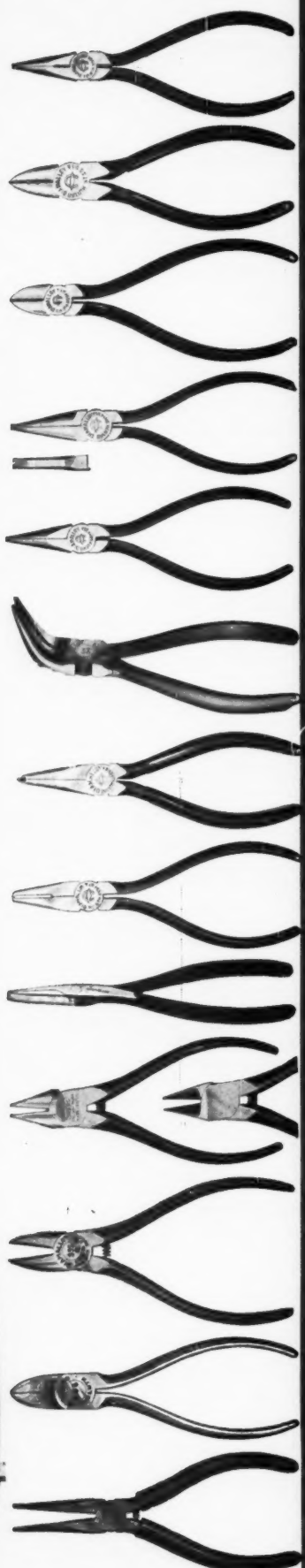

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School Shop TALK

COMMENTS ON ISSUES FACING INDUSTRIAL EDUCATION

More of the Same

The "world do move" but not in the industrial-arts hierarchy. Leaders in the profession have talked for years about doing something concerning the duplication of professional associations. Recently in the columns of this magazine Messrs. London and Karnes proposed that exploratory talks begin on the amalgamation of the Industrial Arts Division of the American Vocational Association and the American Industrial Arts Association. Considerable interest was, and still is, displayed on the part of members of the profession in this proposal as witnessed by the many letters to SCHOOL SHOP.

This is, of course, no new idea. It has been broached by leaders in the field on several occasions and committees have been named to "study the situation." Little study and no action resulted from these earlier abortive efforts.

The AIAA claims that its membership is not particularly interested in such a move, but the association's mechanics for finding out whether there is interest or not is pretty rusty. Apparently it depends on individuals writing in, without invitation, to tell their views.

The AVA says it will talk whenever the AIAA wants to appoint a committee or make overtures.

Apparently both organizations are sitting on their hands while more than three-quarters of the teachers in the field are affiliated with neither group. This lack of action may be indicative of one reason why neither organization has been able to recruit for membership anywhere near a majority of the industrial-arts teachers in the country.

In comparison with other subject-matter fields, industrial arts is far behind. Strong national organizations in every field from physical education to English have been in busy existence for decades. Only industrial arts has failed to organize with a working program of real vigor.

Thanks to a temporary subsidy, the AIAA now has a full-time secretariat and an opportunity to offer more leadership and services to the profession. What the future will bring in this regard is up to the officers and members of the organization.

In the meantime, an opportunity to gain some strength through amalgamation lies dormant.—*L.W.P.*

SCHOOL SHOP Articles Now Indexed

Articles in SCHOOL SHOP are now being indexed in the *Education Index*, beginning with the September issue. The *Education Index* is found primarily in libraries and contains listings of professional articles in various fields of education so that persons seeking information about a topic may find the articles covering it in the various magazines, as most every person who has taken a college course in education knows and has been thankful for.

Those interested in research or in reference materials on industrial education will find the inclusion of SCHOOL SHOP a real help. Many readers of SCHOOL SHOP asked their librarians to have our publication indexed in this reference volume and their efforts are appreciated and have been rewarded. References will be much easier to locate.

We will continue, of course, to index each volume of SCHOOL SHOP in the June issue for the school year.

The Forgotten Student

The forgotten student in modern-day secondary education is the noncollege-bound. As a result of the increase in the number of high-school graduates without a sufficient increase in college facilities to handle them, the percentage of high-school graduates who can be admitted to college is going to decrease. This means that there will be more students than ever who will complete their formal education with high school.

Industrial education offers unprecedented opportunities for being of service to these young people — both boys and girls. Curricular offerings for all levels of abilities and interests need to be developed to help these youngsters make the transition to the workaday world. Soon the public will recognize the need and demand action. Let's hop to it.

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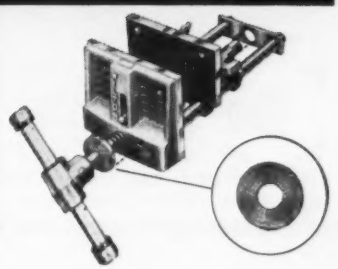

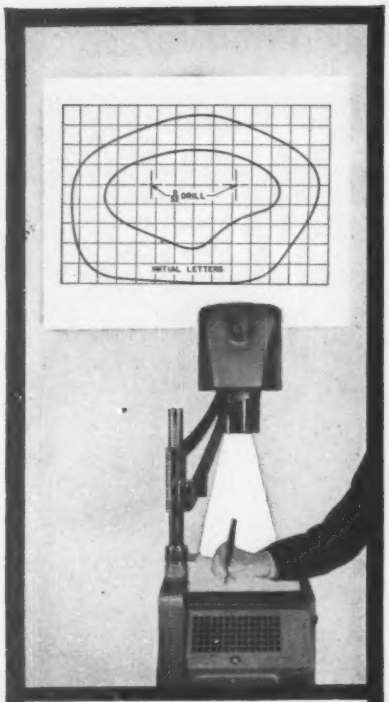

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IN THE MORNING MAIL . . .

(Brief comments about SCHOOL SHOP and the field it serves are invited. Address the Editor, SCHOOL SHOP, Ann Arbor, Michigan.

About the "Merger" . . .

Dear Sir:

I am confused! But I must be in good company, for after reading the letters concerning the Karnes-London proposal, some of the people didn't seem to read the fine print either. As I look again at the letter in the February SCHOOL SHOP, the AIAA and the *Industrial Arts Division* of the AVA were to get together to discuss plans for amalgamation. This is something different than having the AVA and the AIAA hold a joint convention. If this is all there is to the proposal, there would seem to be nothing sinister or complex about it. But if there was an attempt to combine the AVA and the AIAA, then that would be something different. Until I hear or read differently, I will take the Karnes-London proposal to mean exactly, and only, what it says, and would vote Yes for it. . . .

Lee H. Smalley
College of Education,
Buffalo, N.Y.

Dear Sir:

I heartily agree with the statement by Professors Karnes and London that "perhaps a first step in the unification of these groups (AIAA and the Industrial Arts Division of the AVA) would be to hold a joint convention. . ." Furthermore, I trust all would agree that such a joint convention should be held outside the domination of either parent organization, meaning either the AVA or the NEA.

A joint convention for both industrial-arts groups should be singularly devoted to a program of industrial-arts education. Fortunately, an event is already planned which would admirably meet this criterion. It is the 1962 annual convention of the American Industrial Arts Association which is to be held in Pittsburgh, April 16-19, 1962. Therefore, I suggest that the executive officer (in this case a vice-president) of the Industrial Arts Division of the American Vocational Association request approval of the executive committee of the AVA for the Industrial Arts Division to immediately begin cooperatively planning a joint convention at the previously mentioned place and time. In addition, I suggest that the president of the American Industrial Arts Association seek from the AIAA Executive Committee approval to participate in this joint planning.

Perhaps a prior question which makes all the preceding an academic discussion would be for the executive officer of the Industrial Arts Division of the AVA to request a statement of policy regarding vocational education's continued dualism. The AVA operates as an independent organization, while on paper vocational education is a department of the National Education Association.

Donald G. Lux,
Assistant Dean,
University of Illinois, Urbana.

Dear Sir,

The action suggested by Messrs. London and Karnes to amalgamate the American Industrial Arts Association and the Industrial Arts Division of the American Vocational Association is long overdue.

It seems to me that secondary-school people in the two groups would see the many advantages of having a larger, stronger organization. The combination would probably attract teachers who now belong to neither.

In Warren, industrial-arts and vocational classes are quite separate; are for different boys; have different objectives; but work together as parts of the same department and are stronger for so being. I believe the same would apply to organizations.

W. K. Dunton,
Director of Vocational and Industrial Education
Warren City Schools,
Warren, Ohio.

Keeping Twist Drills Straight

Dear Sir:

I noticed in a recent issue of your magazine a "Kink" concerning the fact that the dimensions of twist-drill shanks become obliterated by various ways. I noted that a piece of 3/16" iron plate was used in which holes were drilled corresponding to the size of the drills used, and that each hole was appropriately labeled. I too have used this means in the past but I have found that the holes become enlarged through wear and, hence, somewhat inaccurate.

More recently, I have been using an arc-o-graph to etch the size of the drill on the shank near the flute, and I have even gone on to the flutes, back of the relief, to etch the size. This has been very effective, except in the case of the very small drills. Just recently I have tried grinding the drills to a small flat area near the flutes, but only with limited success. This grinding to a small flat area gives a larger area on which it is easier to etch the size.

I enjoy your magazine. I have used many of its articles in my work as an industrial-arts teacher.

N. R. Ashbaugh,
Industrial-Arts Department,
Kansas State Teachers College,
Emporia, Kans.

He's for the Radial Saw

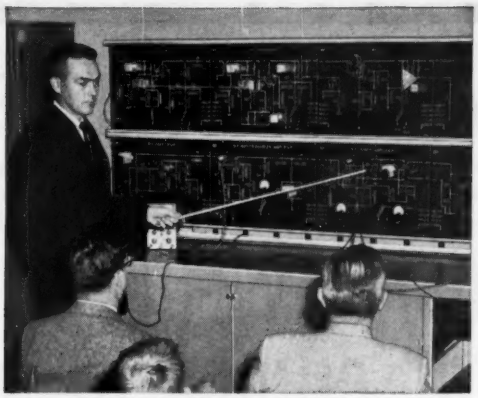
Dear Sir:

The article in the January issue of SCHOOL SHOP, "In Behalf of the Radial Saw" is excellent and presents a valid defense for the use of this tool in the school shop.

Mr. Donnelly is to be congratulated for a timely and worthwhile contribution. I would like, however, to comment on the accompanying photograph showing a student pulling the saw with his right hand. Since radial saws have the blade mounted to the operator's left, a student should be taught to pull the saw with his left hand and to hold the stock with his right hand, thus cutting down the chances of pulling the blade into the left hand. This method will not seem awkward to a right-handed student if he receives instruction in this method early in his training.

Your magazine is always welcomed each month by our staff. We find it very useful and look forward to receiving it.

Gerald E. Clayburn,
Chairman, Applied-Arts Department,
Liberty Union High School,
Brentwood, Calif.



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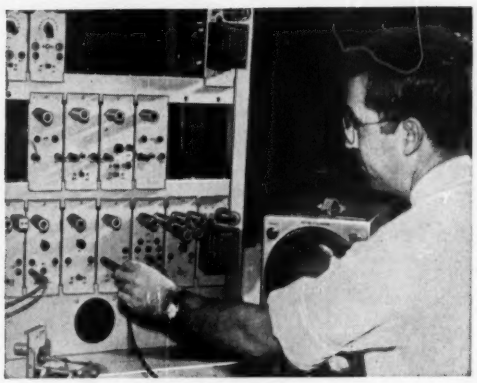

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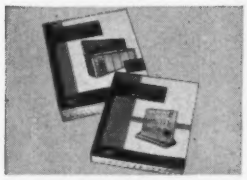

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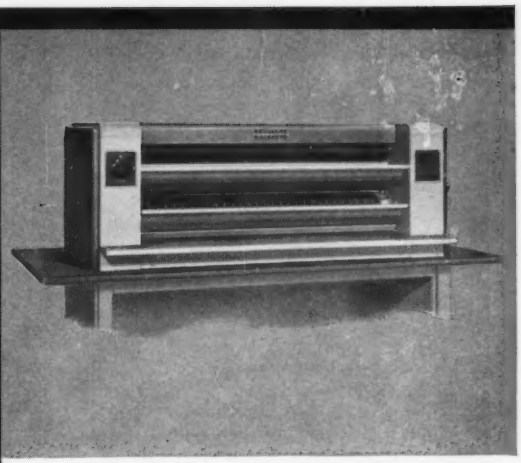

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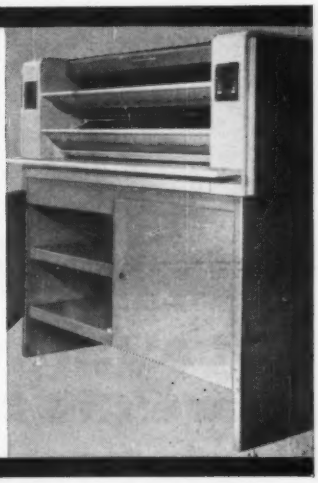

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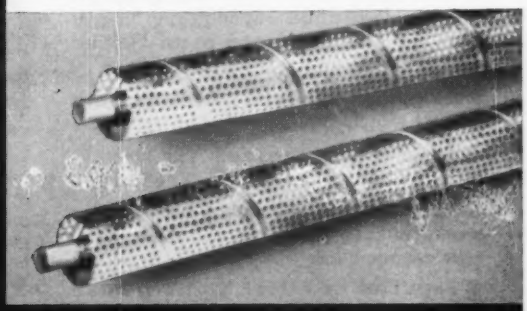

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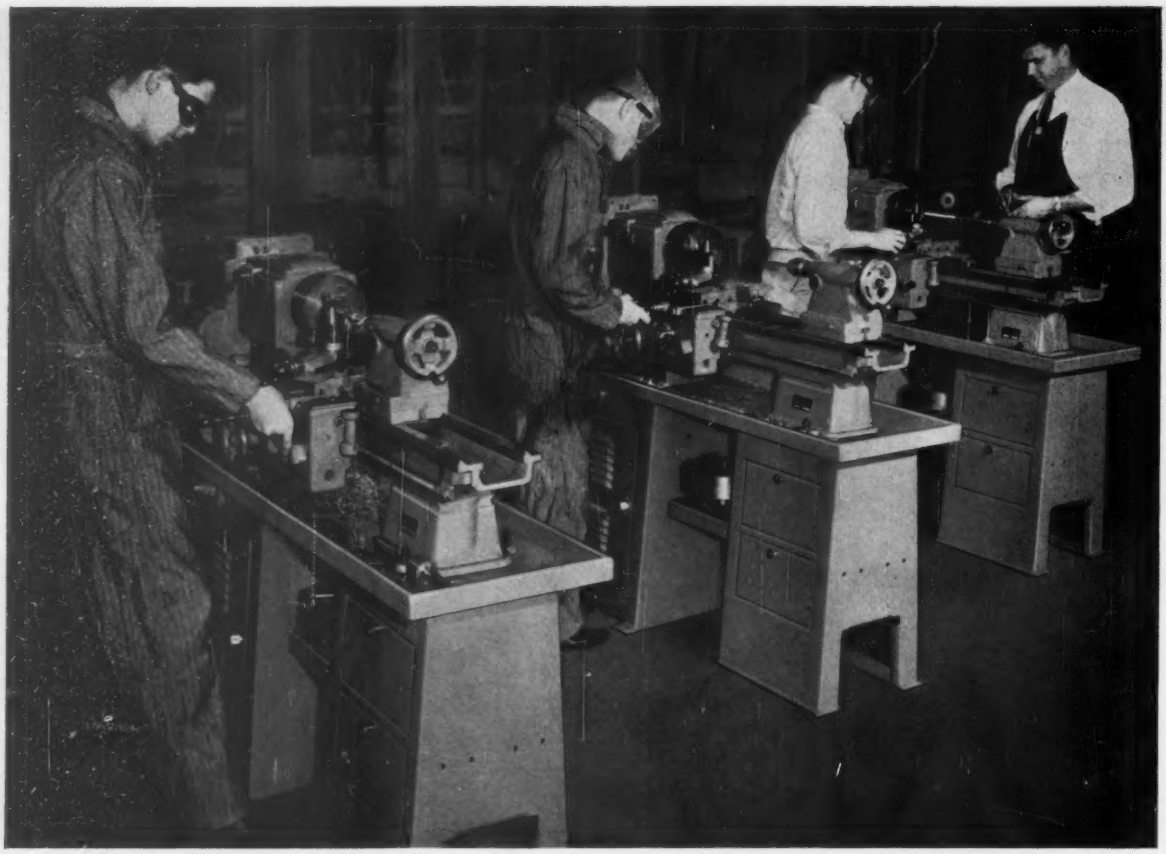

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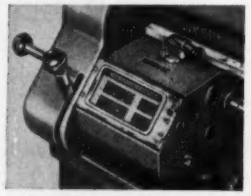

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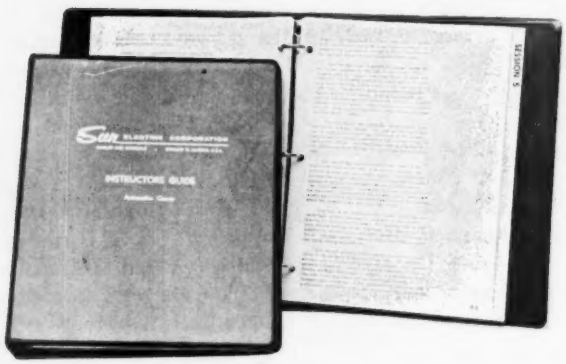

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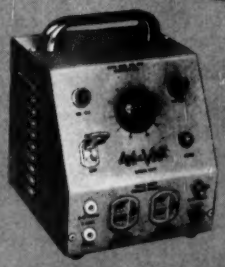

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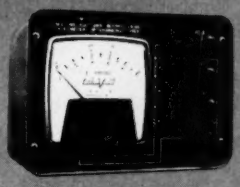

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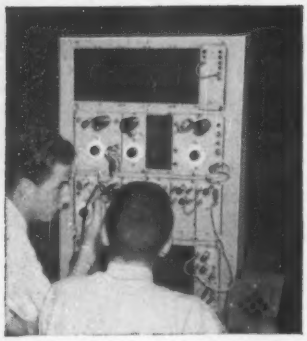

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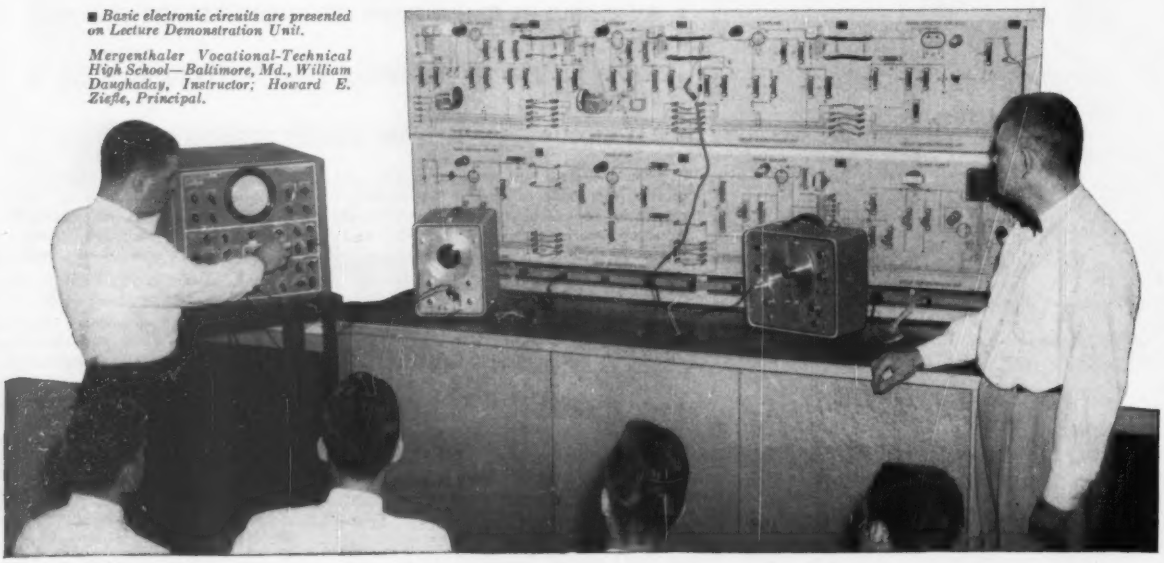

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West Milwaukee (Wis.) High School

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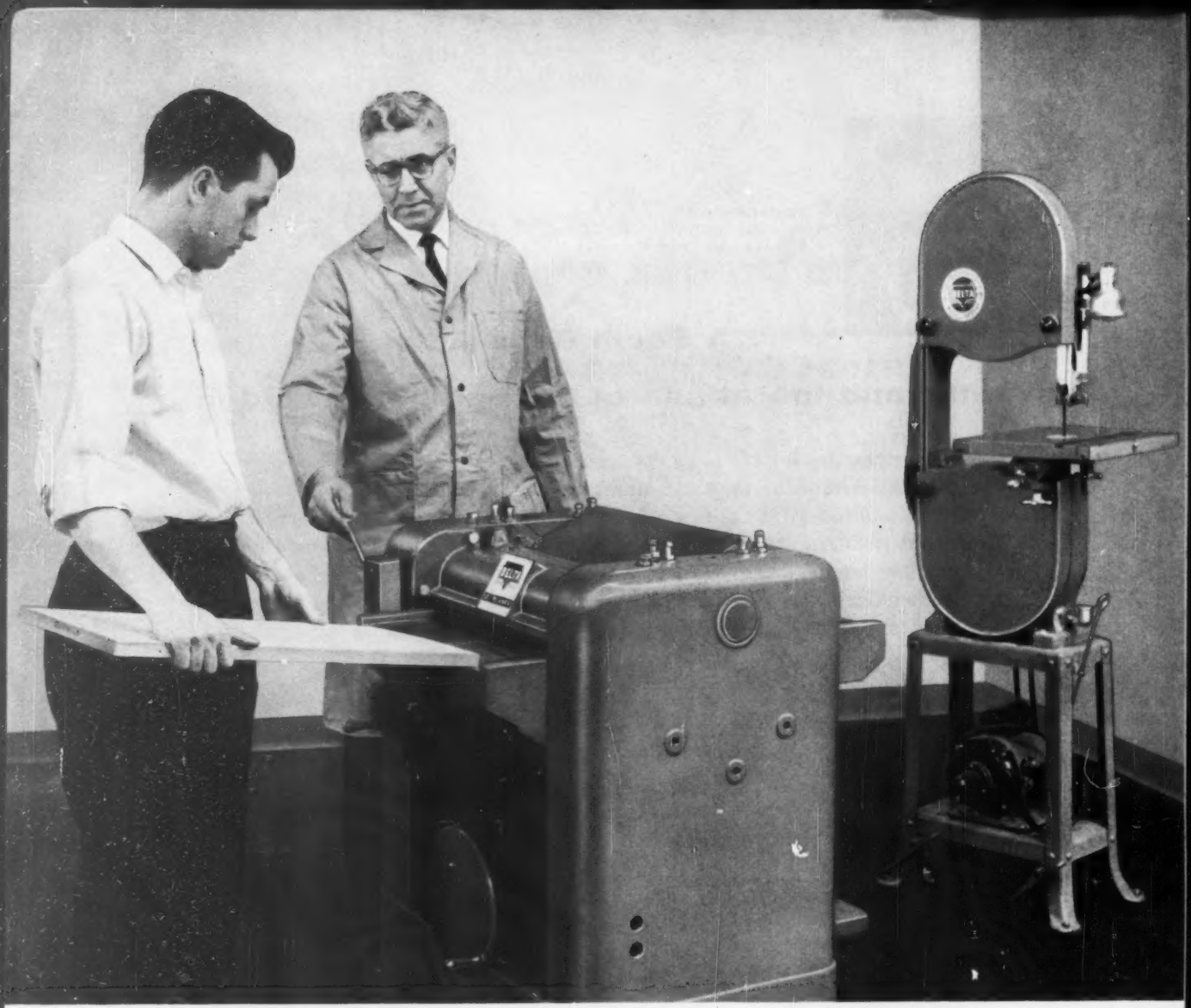

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Now Delta offers a new, low cost 18" Planer for school shops that is designed for maximum student safety. Both the cutterhead and the feed are driven by *separate motors*, eliminating a troublesome clutch. A single "up front" electrical control stops all moving parts at the touch of a finger tip.

Greater work support and more accuracy are provided by a new bed design—a wedge-type construction you normally find only in higher priced, production surfacers. This machine has the capacity to handle stock up to 6" thick, varying in widths to 18"—and gives students the convenience of an easy-dial bed roll adjustment for working with all grades of lumber.

Before you decide on *any* planer, spend a few minutes with your Delta Industrial Distributor (listed in the Yellow Pages under TOOLS or MACHINERY.) He'll show you this machine in action —and show you how to save dollars when you buy power tools for your shop. Visit him soon.

FREE BROCHURE describes all models of new Delta 18" Planer. Specifications on 3 and 5 hp single phase motors; 3, 5 and 7½ hp three phase motors; belt and direct drive operation. Rockwell Manufacturing Company, Delta Power Tool Division, 412J North Lexington Ave., Pittsburgh 8, Pa.

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A restatement of

The Professional Objectives of the I-A Teacher

By H. H. London

Chairman, Industrial-Education Department, University of Missouri, Columbia

AMONG other things, the professional industrial-arts teacher is one who:

1. Has a sound and well thought out philosophy of education, including industrial arts.
2. Is master of the subject matter he attempts to teach and keeps up with developments in his field.
3. Knows how to select and organize subject matter and learning experiences for effective teaching.
4. Is master of a variety of methods and devices for motivating and instructing learners and for evaluating their achievement.
5. Is a good housekeeper and maintains an effective learning situation in his shop.
6. Is proud to be a teacher, works at his job with enthusiasm, grows with the years, and is imbued with a deep sense of service.
7. Can have his ideas criticized and his convictions challenged without making such criticism a personal matter.
8. Joins and supports his professional organizations and works to promote and up-grade his profession.

How do these specifications fit you and me?

What Do We Mean by Objectives?

An objective is an end-point sought in some undertaking. Educational objectives are the aims or purposes of education. They serve three functions:

1. As goals or ends to be attained.
2. As guides in the approach to goals.
3. As standards by which to evaluate educational effort and achievement.

Objectives in education are not something that can be pulled from a hat or jerked from the sky. They must be derived through careful consideration of three factors:

1. The nature and needs of the society to be served by the school.
2. The character and needs of the individuals to be educated.
3. The best there is in educational theory and practice.

The dominant element in American society today is technology. With a little more than 6 percent of the world's population and less than 7 percent of the world's land area, the United States, according to the Twentieth Century Fund, produces nearly one-half of the world's manufactured goods and consumes well over one-third of the world's goods and services. We are, however, being challenged severely. Russia boasts that she intends to beat us, not at war, but by out-educating and out-producing us. To say the least, America must develop and use both its human and material resources with increased efficiency if we are to hold our own in this international struggle. Industrial arts certainly has a contribution to make to the education of people for a society in which industry is the dominant element.

In this country, we are committed to a system of public education designed to prepare all people to live democratically with satisfaction to themselves and profit to society as home members, workers, and citizens. Each youth, differing as he does from others, needs, in a broad sense, essentially four things from the school:

1. To become oriented to the world of nature and of man.
2. To find his place in a society becoming increasingly complex and interdependent.
3. To become established as a successful, selfsupporting citizen and family member.
4. To acquire an understanding and appreciation of the family of nations and the necessity and means for peace among men of all countries everywhere.

Industrial arts, we believe, has its contribution to make to these purposes.

It is an accepted educational theory that people learn best by doing, and we in the industrial-arts field believe that this has been amply demonstrated in educational practice. Furthermore, we know that children tend to have certain fundamental urges, such as the urge to manipulate, to explore, to investigate, to construct, to excel, to beautify, to possess, to be active. Concrete in nature and basic to the economic life of the nation, industrial-arts activities make a strong appeal to youth and adults alike.

Unique Objectives of Industrial Arts

If the secondary schools could teach youth all they need to know through English, or mathematics, or science, or any other one subject, then, for purposes of simplicity and economy, they could throw out all other subjects and concentrate on that one. That this is impossible is obvious to all persons having even a passing acquaintance with education.

It follows, therefore, that each subject in the curriculum must make some distinct and unique contribution to the education of youth to justify its existence. That is, no subject can claim a place in the curriculum solely on the grounds that it helps to do what other subjects do; it must contribute something the other subjects do not contribute. Of course, if one subject can teach better what other subjects also teach, it obviously has a competitive advantage; but even so, it must be justified largely on the basis of its unique contribution. This is especially true if the subject, like industrial arts, is likely to be more expensive to teach than some of the other subjects.

If this logic is sound, then it follows that each and every subject in the curriculum should look first to its unique contributions, and second to those shared in common with other subjects. Among the commonly accepted objectives of industrial arts, there are three that are unique to the subject and should receive major consideration. These are:

1. To develop skill in the care and use of the common tools, machines, and materials of industry.

2. To provide exploratory experiences in a variety of industrial activities, with the view of assisting youth in the selection of an occupation and the subsequent training needed for entry into this occupation.

3. To develop skill and understanding in the making and reading of working drawings.

No other subject, or subjects, in the general education of youth make any appreciable contribution to these objectives.

Skill: What It Does for Us

By whatever terms we define skill, we know that it is important in our world. The skilled person is able to do things with accuracy, speed, ease, and confidence. While concentration is an important element in the development of skill, once a person is really skilled, he can perform even difficult operations w i t h o u t great concentration. Skill, therefore, liberates the mind and enables a person to give his attention to other things. Perhaps more than anything else, skill is the factor that sets highly civilized societies apart from primitive societies. With the increase of automation, more highly skilled people are needed to build, install, operate, and service these machines.

In an attempt to gain academic respectability, there has been a tendency in recent years for some industrial-arts teachers to discount or down-grade the importance of skill in their work and to concentrate on other objectives held in common with other subjects. Some apparently would have us take over the social studies or teach for essentially the same ends. For example, one leader, explaining the purpose of the industrial arts in the January-February, 1959, issue of the *Industrial Arts Teacher*, writes, "The industrial arts is that part of general education which develops in the learner an intelligent understanding of our modern world." This fits history, economics, and science as well as it does industrial arts. Let us not try to be everything to all men. It is high time, I believe, that we return to fundamentals in our own field. Recalling the great artisans of old and the importance of know-how in the modern world, we should make a renewed effort to identify and teach basic tool skills essential to all people in an industrial economy, and we should teach them on purpose, not just maybe!

The Second Unique Objective

There are about 25,000 occupations in which approximately 70 million Americans are employed. More of these occupations are found in industry than in any other field, and 40 percent of the labor force is employed in industry. Although child-labor, compulsory-school attendance laws rightly exclude youth under 18 years of age from full-time employment, more youth will eventually find employment in industry than in any other type of work. Yet, youth knows very little about the opportunities and requirements in this area. The need for exploratory experiences leading to wise occupational choice in industry is clearly apparent.

To be sure, many phases of the school are concerned with the guidance of youth, but in no place except industrial arts are planned and controlled industrial experiences set up for general educational purposes through which youth can explore these activities and try themselves out in a real and believable way. The general shop is especially advantageous for this purpose, provided it is set up and operated properly. For this purpose, the shop should include a wide assortment of basic industrial experiences which lend themselves to school-shop conditions and which are appropriate to the age and maturity of the pupil; and the pupil should be directed and managed in such a way that he obtains some experience in all of the activities, not just the one or two he happens to like. Moreover, the teacher must realize what the guidance function involves and seek always to discover aptitudes and develop interests, and to disseminate information concerning the opportunities and requirements in the various industrial occupations.

According to a noted sociologist, "One's occupation is the watershed down which the rest of one's life tends to flow." No industrial-arts teacher, therefore, need apologize for emphasizing the unique exploratory and guidance function of his work. The truth is, he can probably reach and guide many boys who will not respond well to other phases of school work.

The Third Unique Objective

The occupation of the draftsman is on the critical list in America today. Recognized the world over as the universal language of industry, working drawings are increasingly important in our rapidly changing technology. Consumers as well as the producers of industrial products need an understanding of the basic principles of shape and size distribution. Nowhere else in the general-education program is any effort made to teach this essential knowledge and skill. Drawing should be taught as a functional part of shop work; and in addition, unit courses in drawing should be taught in the senior-high school. This is one of the critical areas in American technology, and industrial-arts teachers should recognize it as such.

Other Objectives of Industrial Arts

Beyond the above stated purposes of industrial arts, there are several purposes shared by other subjects in the secondary school, but nevertheless quite important. They are:

4. To develop consumer knowledge and appreciation.

5. To develop safety habits and attitudes.

6. To develop leisure-time interests and abilities.

7. To develop desirable personal-social traits, such as dependability, patience, resourcefulness, cooperation, and the like.

Many other statements of objectives of industrial arts are found in the literature on the subject, but I will settle for these seven. Too many objectives lead to a halo and the tendency to lose them all. Let us analyze these latter objectives in some detail.

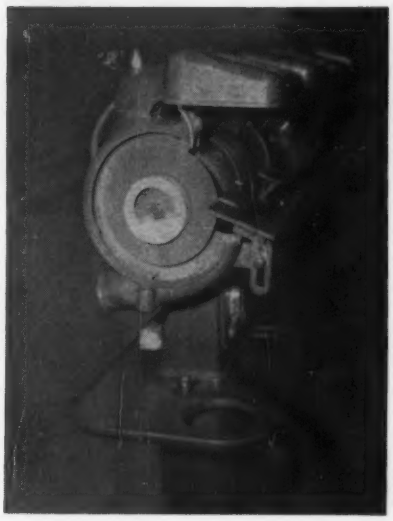
Consumer Knowledge and Appreciation

All persons are consumers of a whole array of goods and services, which, of course, are not of uniform value and importance. It is a fundamental concept of economics that unless people consume goods and services produced, the economic system itself soon breaks down. On every hand, throughout the day and night, consumers are bombarded by all sorts of appeals to choose, buy, consume. Since the means of almost all individuals are limited, it be-

(*Continued on page* 55)

Ideal for cooling work during light grinding

Atomizing Flange for a Grinding Wheel



By C. G. Sykes
Newton Iowa, Public Schools

A NUMBER of years ago, two young researchers experimented with a method for cooling the work in a light-duty grinding operation.

For some time now, I have used this problem in my classes to teach related and machine-tool work.

All this item consists of is a turned mild-steel or aluminum flange, backed by a felt disc, with a coolant reservoir that is a 30° recess bored in the outside face of the flange and fed with an oil can or tank.

This particular flange is a substitute for the usual iron or pressed-steel flange.

One of the virtues of this item is that it can be used to teach about centrifugal force, cooling by vaporization, and flange specifications for grinding-wheel safety standards.

The dimensions given in the drawing are nominal and can be changed at the discretion of the instructor.

The coolant is introduced into the face of the flange and will pass through the holes and on to the porous wheel and vaporize at the circumference of the wheel. For light grinding, this will take the place of the complicated jet method. It makes, furthermore, an interesting construction problem.

The procedure follows:

Finish turn and face a ½″ x 3″ mild steel or aluminum disc. Lay out and drill six 30°-3/16″ vent holes in the disc. Drill and ream ⅝″ arbor hole and recess it from the center of the hole to within ⅛″ of the rim, 1/16″ deep. Reverse the workpiece in the lathe chuck and bore a 2″ hole, ⅜″ deep, leaving a web in the center of the disc.

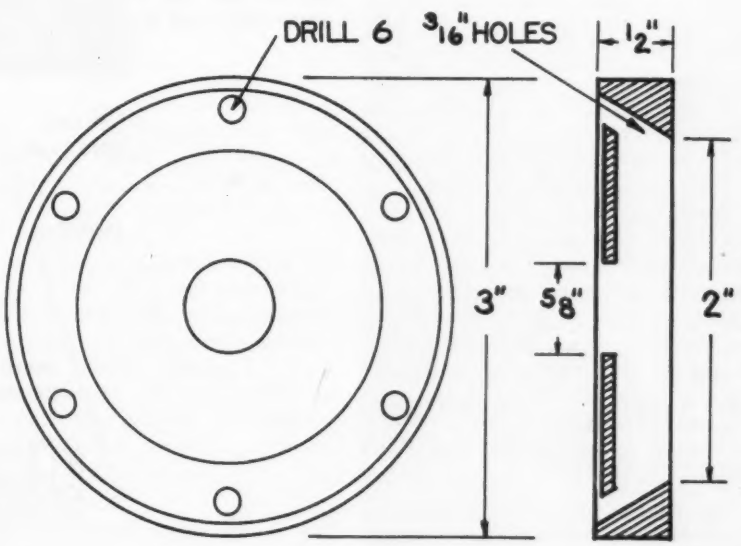
Set the lathe compound at 30° to the center line and, using the compound feed screw, bore an angular recess to meet the web. Face from the center hole for the finishing cut. (See the cross section for the finished appearance.)

Make a thin felt disc, 3″ in diameter, and cut a ⅝″ hole in the center. Remove the paper label from the grinding wheel, and mount the felt disc on the arbor and tighten the nut.

The assembly on the wheel is thus: the felt disc goes next to the wheel on the arbor; then place the metal flange on the arbor; finally place the nut on the arbor, over the flange, and tighten.

Start the grinder and introduce the coolant into the flange with either an oil can or tank. Allow a few minutes for the coolant to reach the face of the porous wheel.

Variations of the flange are possible. For example, a thicker flange will hold more coolant, cutting down on the number of refills, but it will also call for more care in the design of the boring tool. The use of aluminum will make the construction job easier, but it may be a little more difficult to get hold of bar stock of a suitable size for the required rough-turning dimensions. ★



A new material for your "plastics" area

Expandable Polystyrene: Projects Unlimited

By Ira H. Johnson and Donald N. Anderson

Chairman and member, respectively, of Industrial-Arts Department, Mankato State Teachers College, Minnesota

RELATIVELY new to industry, and practically nonexistent in industrial-arts shops, is a rapidly growing plastics area: expandable polystyrene—used commercially (Fig. 1) for ice buckets, insulation of buildings, disposable drinking cups, floats for nets, and a multitude of other products.

This interesting and valuable process is possible in *every* industrial-arts shop. With a little work and practically no expenditure for equipment, you can start production. Material cost is low, and project possibilities are limited only by the creativeness of the instructor and of his students.

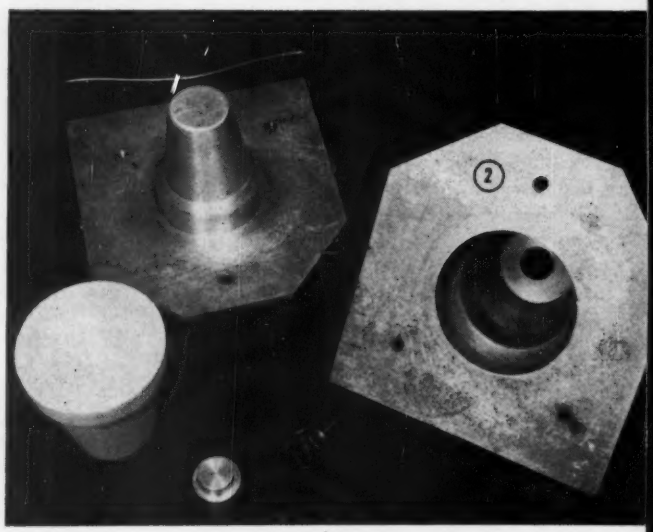
The Process

The raw or virgin plastic beads[1] are first carefully pre-expanded with a heat source. The mold is assembled and filled completely with pre-expanded beads. The filling hole is closed and the entire unit is exposed to heat, usually live steam. This further expands and softens the beads so that they fuse into the shape of the mold.

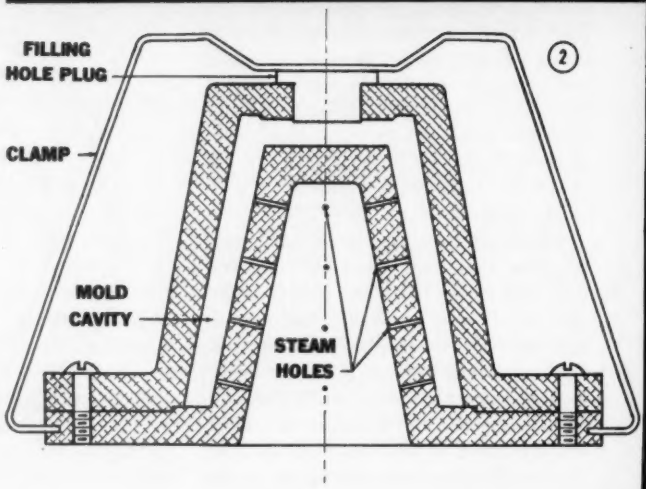
The industrial-arts process.—First, fabricate a mold, usually two parts, from cast or spun aluminum (Fig. 2).

The surface finish on any part touching the beads should be smooth. Also, the usual principles of draft must be observed to facilitate product removal. Small (1/32″) holes are drilled on the inside surface of the mold and one large (1″ to 2″) hole should be provided for filling. A "filling hole" plug and a device for clamping the parts together complete the unit.

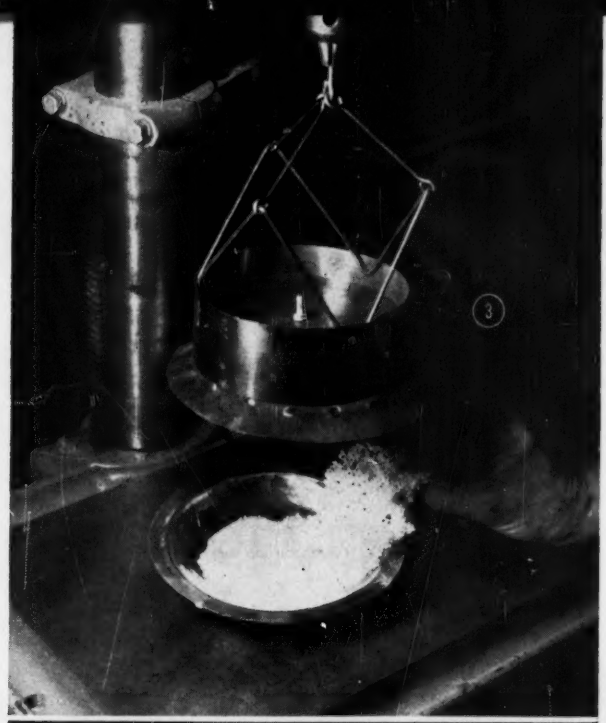
Second, pre-expand the beads. Various methods are feasible. An endless belt (Fig. 3, bottom), moving slowly, and with a heat source above the moving beads will do a good job; or a shallow container with a layer of virgin beads may be placed under an inverted hot plate. (Fig. 3, top). Careful observation in either case will determine the correct distance between the heat source and the beads and the proper length of "exposure" time. Should some of the beads come out of this step together, they can

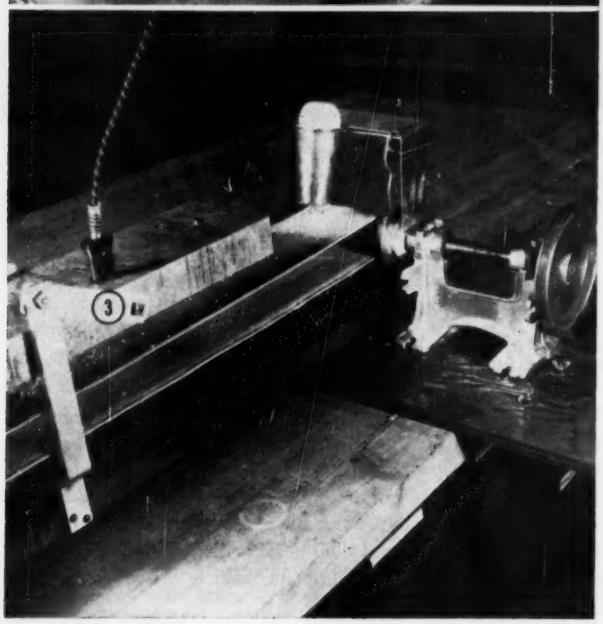


Top left: A few of the projects that can be made from expandable polystyrene. Right: A drawing for a mold plus the mold and a planter made from it.



[1]Available as "Dylite" from Koppers Company, Inc., Pittsburgh, Pa., or as "Pelaspan" from Dow Chemical Company, Midland, Mich.





Top left: Two methods of expanding the beads of polystyrene before pouring the mold. Right: Pouring the mold with the aid of a portable shop exhaust system, and an ordinary pressure cooker for steaming.

and should be separated by rolling them between your fingers.

Third, fill the mold cavity. A complete fill is necessary, and various mold cavity configurations will require different techniques. Gravity filling plus a little vibration will often suffice, but a vacuum source (portable shop exhaust systems) properly applied will facilitate matters (Fig. 4).

Four, expose to steam. Various methods of obtaining steam at 15-20 lbs. pressure are possible; but a most convenient, simple, and inexpensive device available to most industrial-arts instructors is a large pressure cooker with a pressure gage (Fig. 5).

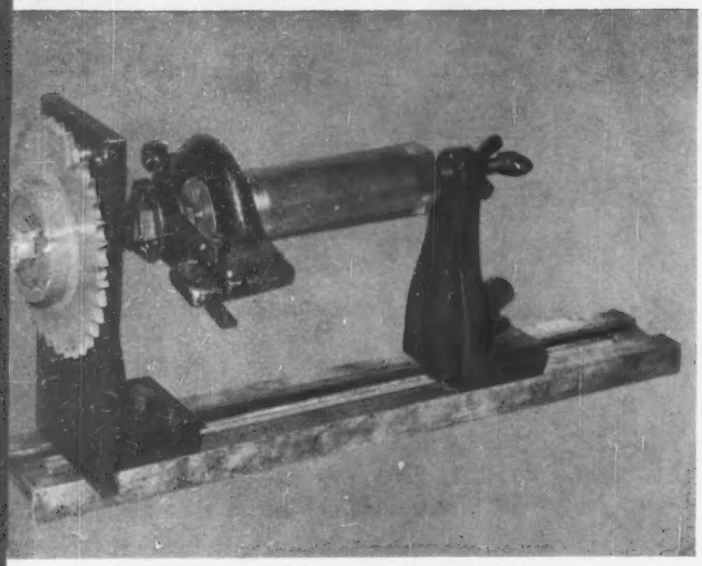
Pour two cups of water into the cooker and place on a hot plate set to "high" heat. When the water boils, place the filled and clamped mold inside and tighten the cooker cover. After the pressure reaches 15 to 17 pounds, wait for about one minute.[2]

Remove the entire unit from the hot plate, open the vent, and place under cold water. When the steam pressure is "reversed" you will hear a sucking sound around the "safety plug." Remove the cover, take out the mold, unclamp, and remove the project. Air pressure through the mold "steam holes" sometimes helps remove the project.

A "large section" project will usually not "jell" completely through with the preceding method. A probe, constructed of ¼" copper tubing, having one end closed and with many small holes distributed over the surface, will then do the job. Develop 15-17 lbs. of steam pressure, force the probe into the filled mold cavity, and turn on the steam. Gradually withdraw the probe after one minute and then cool the mold.

If careful examination shows the project to be "perfect," the beads were correctly pre-expanded, the mold cavity was completely filled, the steam pressure was right, and the exposure time was correct. If the project is imperfect, one or more of the previously mentioned variables was probably not correct. Experimentation and experience will provide information to correct the fault. ★

[2]Varies with mold construction, size, and shape.



This index head is an excellent project for advanced students and a useful tool around your shop. It has the advantage of requiring inexpensive materials that are usually on hand or easily acquired.

S-t-r-e-t-c-h the budget with

A Shop-Made Index Head

By Robert K. Michael

Baugo Township School, Elkhart, Indiana

MINE was the shop teacher's perennial problem: I needed equipment. The budget said, "No!"

Mine was the shop teacher's usual solution: return to my shop and make it. In this instance, it was an index head that I needed.

Since the value and purpose of an index head is to divide a work piece into any number of equal parts, I knew that without a gearing system the number of possible divisions would be limited. I reasoned that without using gears, and by careful selection of index plates, I could make an indexing device that would make available the divisions needed most frequently.

My basic idea was to place the work piece between centers, permitting rotation, and to make provisions for locking the work firmly at the desired division points.

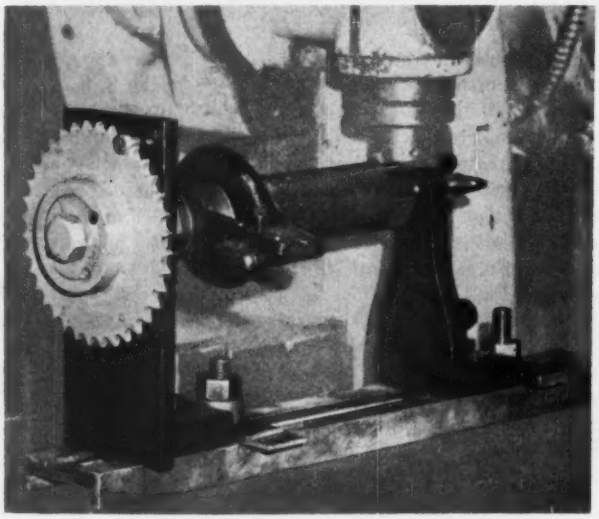
I chose two sprocket gears for my index plates. One, with 40 teeth, permitting indexing of 2, 4, 8, 10, 20, and 40. The second, with 36 teeth, indexing at 2, 3, 4, 6, 9, 12, 18, and 36. This would permit positioning for work operations to produce square, hexagon, and octagon shapes.

I made mounts for the centers of ½" steel plate. I selected ¾" angle iron for the ways. The ways can be bolted or welded and care should be exercised to keep the ways parallel. The length of the ways should be determined by the needs of each shop but it should be kept in mind that rigidity in construction is important. The mounts can be moved along the ways and clamped securely in any desired position by the hold-down arrangement of bolt and threaded plate.

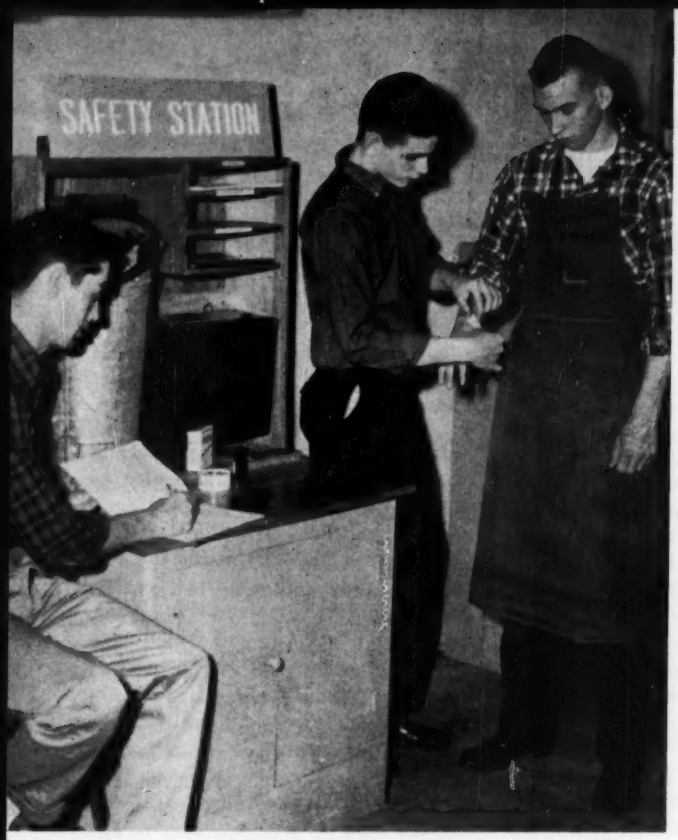
I made the tailstock center by working a 60° point on a ¾" bolt and threading a hole in the ½" steel plate mount. A lock nut on the back side of the mount permits adjustment for proper tension on the work center.

The headstock mount presented special problems. It had to be free to rotate and provide rigid support when locked in position. Here the bolt becomes a shaft running through the steel plate with the sprocket mounted on the back side. The work is driven by a dog locked between two nuts. The 60° point must be shaped on the work end. The sprocket is held firmly in position by placing a pin between the teeth and into a hole in the mount.

It works. It is simple. I would caution that extreme care must be taken to align headstock and tailstock centers on a horizontal plane. But if you and your students have need for an index head and the budget will not stand the strain, I recommend making this device. ★



The index head at work in a milling operation. Note indexing marks near teeth.



A safety station located in the shop is headquarters for the student-safety foreman. Safety records and materials are stored here.

Attitude plus awareness plus skill equal safety

A Comprehensive Safety Program for the Shop

By Arthur H. Schwartz

Director of Industrial Arts, Fredericksburg, Virginia, Public Schools

OUR industrial-arts department developed a program to develop a safety consciousness in our students. The program is based on a belief that students trained to think that shop safety is important will be alert to hazardous situations and more skillful while engaged in operations where an element of danger is present.

Our comprehensive general shop provides instruction for boys and girls in drafting, electricity, ceramics, printing, general metals, and woodworking. With the machines and equipment that are necessary to instruction, it is imperative that we have an effective safety program that will penetrate each student's thinking. Our program is based on and emphasizes three elements: attitude, awareness, and skill.

We believe that the individual student must be involved and must know that he is involved if we are to have a safe shop environment. In practice, our program functions to accomplish student involvement by developing a safety consciousness within the individual student.

We introduce each new class to the shop with a general orientation period about behavior in the shop. Our safety program begins at this time. The instructor leads the new group in discussing basic points, and experienced shop students are called on to assist the instructor in "reaching" the students.

The orientation serves to acquaint the student with general safety features of a shop, such as the danger in using dull tools, basic information about the various machines, and introductory information about specific shop areas. The class then forms into small groups for discussion periods concerned with the special safety practices necessary in the various shop areas.

To encourage continuous student participation, the program provides for the students to share responsibility. We have a student safety foreman and a student safety committee. They work

(*Continued on page* 48)

Teacher and students discuss eye protection. Note daily safety record in background.

It's now more than the internal-combustion engine

Power Mechanics Blasts Off !

By Harold T. Glenn
Hughes Junior-High School, Long Beach, California

RECENT professional-magazine articles have discussed the subject of power mechanics as a unit course in a general-shop program with the content based solely on the small internal-combustion engine. Many teachers of *automechanics*, however, have incorporated a similar unit to extend the scope of their course reflecting the need for the new title of power mechanics to include the expanded coverage.

The course title "Power Mechanics" reflects the increased use of the internal-combustion engine to replace human muscle power. Originally, the piston-type engine was developed to propel automobiles, and the auto-mechanic-course content, which evolved naturally, reflected the theory and servicing of that vehicle. But small internal-combustion engines have come into widespread use to power lawn mowers, pumps, electrical-power plants, boats, and other minor transportation units. For aircraft, jet engines have replaced reciprocating-piston engines and have themselves been replaced by rocket engines in space vehicles.

In the industrial-arts field, another re-evaluating force has evolved. Lay criticism has been directed at the public schools, especially at the so-called "soft" subjects, pointing out that students have little time to "waste" in subjects that do not contribute content necessary for survival in this atomic age. Many critics attack industrial-arts subjects on the premise that they make no contribution to the student's background of "hard-core" subject matter. Most industrial-arts leaders disagree, pointing out that industrial arts has always been considered one area of general education and, therefore, can justify its position through making its unique contribution to the educational process, applying functional understanding to concrete, life-like situations.

Another trend was instigated by the higher skill level required in technician-training programs, which is positioned between trade training and engineering. It is sometimes referred to as the "blue-collar" program. Graduates of technician-training programs are needed to relieve the load on professional engineers, taking their place in jobs which *cross over* areas of production and technology. This program places emphasis on power comprehension, mathematical applications, and a thorough understanding of scientific principles.

Analysis of the Problem

These changing conditions—and the ensuing problems—have focused attention on the traditional programs. What should be the content, objectives, scope, and sequence of a high-school, power-mechanics course? A vocational-education course? Are new teaching techniques required?

Actually, each new course is essentially a shift in emphasis, depending on the skill level to be achieved. The traditional course in automechanics has as one of its objectives training in automotive repair. The extent and depth of training depends on the philosophy, objectives, and equipment of the shop. It ranges all the way, on the one hand from "pure theory" classes in which the study of the automobile is made solely through reading and discussion, to the opposite, the repair approach of trade training. How may a correct balance be achieved?

Naturally, such balance depends on the objectives to be reached. In a junior-high-school course, the main objectives are *exploratory*. In terminal trade training, vocational skills and understanding go hand in hand. The major emphasis will be on *technology* in the technician-training program.

Outline for Power Mechanics

The accompanying outline compares a course in power mechanics with the traditional auto-mechanics offering. With goals more clearly defined, we can move toward our objectives more confidently.

Techniques

Basically, all industrial-arts objectives are achieved through the project method. The final concrete result is easy

to point to, but every far-thinking educator knows that the project is only a means to an end, giving the teacher a "lever" for making theory come alive. The lecture and textbook are supplemented by a first-person contact with materials so as to apply educational concepts.

Each project in a dynamic course must contain definite science, mathematics, reading, writing, and drawing assignments, or it should not be given room in the crowded curriculum. A project cannot be justified on the basis of how well it will look in the annual project fair. It must be selected solely on the basis of how much it contributes to the objectives of general education, how well it helps to round out the competency of the student, how well the academic lessons can be applied.

An industrial-arts student may never have to grind valves in his lifetime, but the application gives him a direct appreciation and understanding of an internal-combustion engine. In the same way, the application of mathematical and scientific principles gives him an appreciation of the scientific and mathematical world about him — *probably more important than grinding valves*— as these principles may be a very essential part of existence in the insecure world of tomorrow.

The project must be a means to an end, a means of achieving objectives established before the project is selected. Then, the method of implementing the objectives comes to the fore. Some selfevaluating questions that might be asked at this time are: "Am I teaching my students how to clean spark plugs, adjust points, and set the ignition timing?" Or, "Am I using these projects to develop an interest in applied science, in the application of algebra to solve simple equations, and for skill in reading?" "Do I stress skill in research, outlining reports, writing, and public speaking?" (Do you have a dictionary in your shop?) Certainly, there would be little discussion about eliminating a course that was making such a concrete contribution to the objectives of general education.

In this way, each instructor can determine whether or not a car or small engine should be brought in to achieve the objectives, the repair being incidental, or whether the same objectives can be reached on a piece of laboratory equipment. It might be well to point out at this time that using live projects and using laboratory-type equipment has certain advantages and disadvantages. And, too, it is probably true to say that it is not wise to base all projects on live engines or all on laboratory-type equipment. A skillful blending is required so that the teacher can use the interest-stimulating experience of working on live engines, and at the same time, capitalize on the efficiency quotient inherent in the use of laboratory-type equipment.

Live Jobs: Advantages

1. Working on his own car or a small motor-driven device is definitely a challenging and interesting experience to a student. His desire to learn, to be accurate, and to achieve is unusually strong.

2. There is no need to stock parts and supplies because the student buys his own.

3. There is no need for special laboratory set-ups, with a resulting saving in money and space.

Live Jobs: Disadvantages

1. It is very difficult to correlate classroom work with shop activity because mechanical devices do not readily lend themselves to a psychological, learning-order sequence.

2. It is difficult to provide identical learning experiences for every member of the class because it is not possible to bring in enough motor-driven devices to provide equal work experience for each student.

3. It takes a disproportionate amount of teacher time to check each operation.

4. Students might not be able to purchase the parts necessary to do a first-class job on home equipment, which results in poor public—and family!—relations when the job is poorly done.

5. If a student forgets to get necessary parts, purchases wrong ones, or

(*Continued on page* 44)

		Combined Progressive Power Mechanics Program	
Unit Blocks	**Traditional Automechanics** (Vocational Objectives)	**Power Mechanics** (Unit Shop Program)	**Modernized Automechanics** (Upgraded to Meet the Demands of Our Times)
POWER		History of power Nuclear engines Gasoline engines: Four-stroke cycle Two-stroke cycle Diesel engines: Four-stroke cycle Two-stroke cycle Electric motors Turbo-jet engines Turbo-prop engines Ram jet engines Rockets	
ENGINES	Repairing automotive engine units (with major emphasis on manipulative skills)	Disassembling and assembling small engine units (with major emphasis on applied science and mathematics)	Disassembling and assembling small engine units (with major emphasis on applied science and mathematics)
ELECTRICAL	Repairing automotive electrical units (with major emphasis on manipulative skills)	Experiments in fundamentals of electricity (with major emphasis on applied science and mathematics)	Disassembling and assembling automotive electrical units (with major emphasis on applied science and mathematics)
CHASSIS	Repairing automotive chassis units (with major emphasis on manipulative skills)		Disassembling and assembling automotive chassis units (with major emphasis on applied science and mathematics)
RELATED TECHNICAL INFORMATION	Use and care of common hand tools	General safety practices. Use and care of common hand tools	Auto-shop safety practices

A lot depends on the shop situation

Selecting a Meter for Your Shop

By Walter R. Westphal
University of Illinois, Urbana

TEACHERS planning an electricity unit in the general shop are often faced with this question: What kind of meters are needed? This question is asked whether the electricity area is to be in a small corner of a general shop or a unit electricity shop on the senior-high-school level. This article will try to answer this question by discussing various meters presently available in relation to the needs of school shops.

Probably the most common metering need arises in measuring voltage. One metering scale is needed for measuring commercial a-c power lines; another would be needed for the lower-voltage secondaries of various transformers; and a third is required for the higher-voltage secondaries of some radio and power transformers. In addition, several ranges of d-c voltage would need to be metered. In the past, many teachers have met these needs by purchasing several ranges and types of meters, both ac and dc.

The measurement of electrical resistance is almost as important as the measurement of voltage in the school shop. Continuity checking, appliance servicing, and other electrical repairs can be simplified through the use of an ohmmeter. Resistance measurements are also indispensable if any radio construction is done. Students seldom have a need to measure current. Usually an ammeter is needed only when the teacher is demonstrating a circuit to a group of students. The ease with which ammeters can be damaged or ruined almost restricts their use to teacher demonstrations, particularly with inexperienced students.

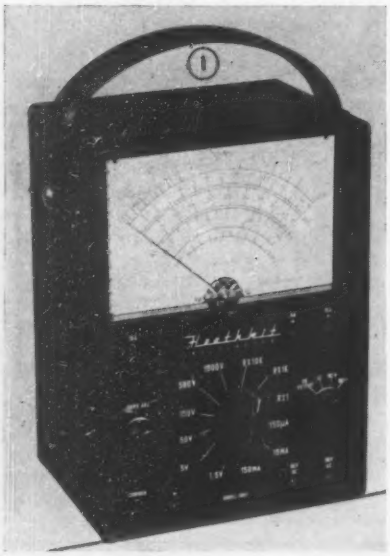
Laboratory-type meters are far too expensive, too fragile, and usually too limited in their ranges to be of value in the school shop. What is needed is a more rugged instrument, even if some accuracy is sacrificed. An accuracy of plus-or-minus 5 percent is well within most needs.

Two types of meters suitable for schools are currently available. One type, commonly called a multimeter, has several ranges of a-c and d-c voltages along with several resistance ranges. They are low-priced, portable, and quite suitable for the school shop. Two models of multimeters are shown (Fig. 1 and Fig. 2). The seven a-c and d-c voltage ranges (0-1, 5, 10, 50, 100, 500, 5000 volts) and the three resistance ranges (0-100, 100K, 1000K ohms) are controlled by front-panel switches. Provision is also made for the measurement of current. Four separate instruments are combined into one: d-c voltmeter, a-c voltmeter, ohmmeter, and ammeter. The cost is comparable to one laboratory-type meter.

The second type of meter (Fig. 3 and Fig. 4) found more and more in schools is the vacuum-tube voltmeter (VTVM). This instrument is similar to the multimeter in that the ranges for voltage (ac and dc) and resistance are approximately the same. It differs, however, in that it needs to be plugged into the power lines. The VTVM is not as accurate on some ranges and in some applications but is almost burn-out proof. Its disadvantage is the need for outside power and a brief warm-up period. For certain radio and TV applications it is indispensable. An additional high voltage probe enables the VTVM to measure as high as 30,000 volts.

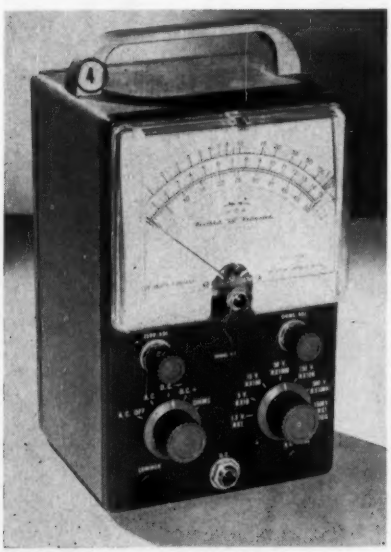
Both the multimeter and the VTVM lend themselves very well to the industrial-arts shop. For general purposes, the multimeter is preferred. If any electronics work is done, however, the VTVM is needed. There are several advantages in purchasing these instruments in kit-form. The cost is nearly half, always an important consideration, and they are excellent advanced-pupil projects. The instructions furnished enable an average high-school student to construct either type of instrument in only a few hours time. Factory-wired meters are also available in various price ranges. Because the accuracy of these instruments is not comparable to that of laboratory instruments, the teacher should bear in mind that exercises designed to illustrate Ohm's Law are apt to be disappointing.

The need for quantitative measurements of voltage, resistance, and current cannot be disregarded at any level of



instruction. Meters are fundamental to the electricity area. Multimeters and VTVM's are not a strain on the budget, especially when purchased in kit-form. The portability and lower cost of multimeters makes them preferable for general-shop applications. Their operation is straightforward and easily learned. Function switches change them from voltmeter to ohmmeter to ammeter very quickly.

Laboratory-type instruments are too severely limited as regards both function and range to fit into the school-shop program. A better answer to the needs of students is found in multimeters and vacuum-tube voltmeters. ★



Increase drawing output by

Drafting to Music

By James D. Cadagin
Community High School, Pekin, Illinois

SINCE the first cave woman hummed soothing words to her baby and spread the word to neighboring caves, man has known that music has power to influence favorably the sense perceptions. Industry and business use this power to establish a pleasant atmosphere, farmers pipe music into their barns to sooth their milk cows, and I, intrigued by claims of improved efficiency, decided to experiment with music in my drafting classes.

I installed a turntable, amplifier, and speakers in the drafting room for a trial period. The results were so satisfactory that I expanded the system to a permanent installation, wiring it into the school's PA and intercom system.

During the trial period, I experimented with varying both the quality of music and length of playing time to determine what the effect would be on students. I found that a well-modulated, middle-register, instrumental selection was the best. Too wide a range and vocal music would attract the student's attention to the music, thereby offsetting the usefulness of the program.

From time to time, I have endeavored to learn the students' reactions. Generally, the results have been favorable. The following was determined from questionnaires submitted to 290 students.

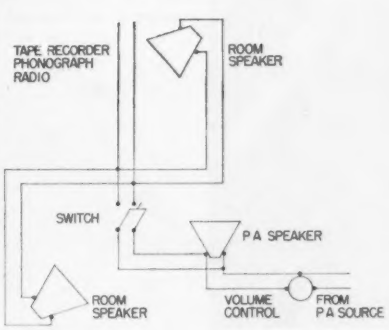
Did enjoy music	*Did not*
94.8 percent	4.8 percent
Were aware of music	*Not aware*
80.7 percent	17.2 percent
Favored music entire period	*Did not*
92.1 percent	5.8 percent
*Thought music helped in work**	*Interfered with work*
69.3 percent	4.2 percent
Desired music to be continued	*Desired music be discontinued*
94.5 percent	5.1 percent

*25.9 percent felt that it made no difference.

Industry has used this idea for many years with no ill effects and it is highly unlikely that students' learning will suffer. Also, students are more quiet when the music is on. This has been brought to my attention by teachers who visit my classroom and spontaneously comment on the low noise level. The music can also be used as a "control" by lowering the volume to emphasize the noise students are making.

By wiring the system, as in the drawing, I control the operation for these conditions: Provide music over the P-A system and room speakers, which is regulated by the volume control. Lecture, by lowering the volume to permit normal classroom voice to be heard. Use recorders, phono systems, or radio for special purposes by switching, which eliminates any possibility of feedback into the P-A system. I also use the system for delivering lecture material and find that I give better lectures by taping them before delivery. During the delivery I am released to perform other classroom duties.

While it is not a primary goal, but rather something of a fringe benefit, I have found that having music in the drafting room presents an opportunity to instruct the students, in a very casual manner, on how to listen to and appreciate fine music. ★



A project for teaching woodworking machine procedures

A "Shop-Tested" Portable Drafting Table

By Alvin R. Lappin

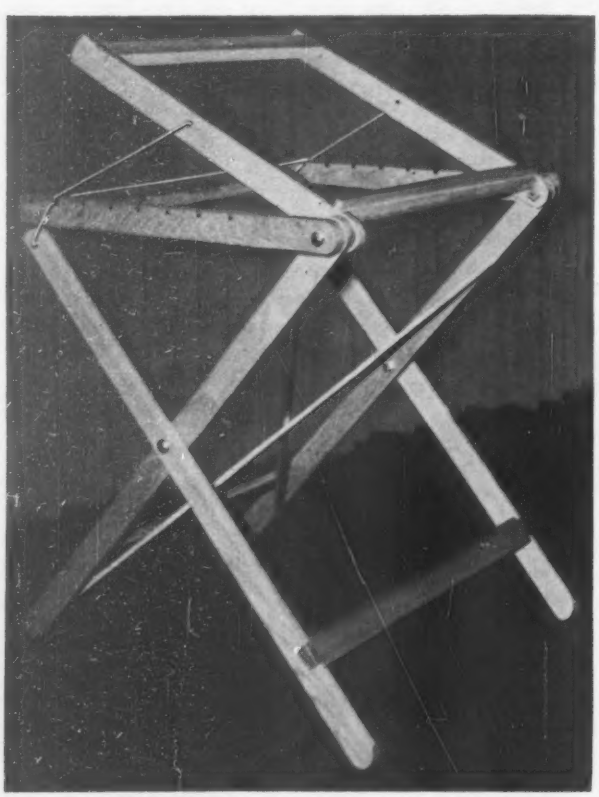
Associate Professor of Industrial Arts, San Jose, California, State College

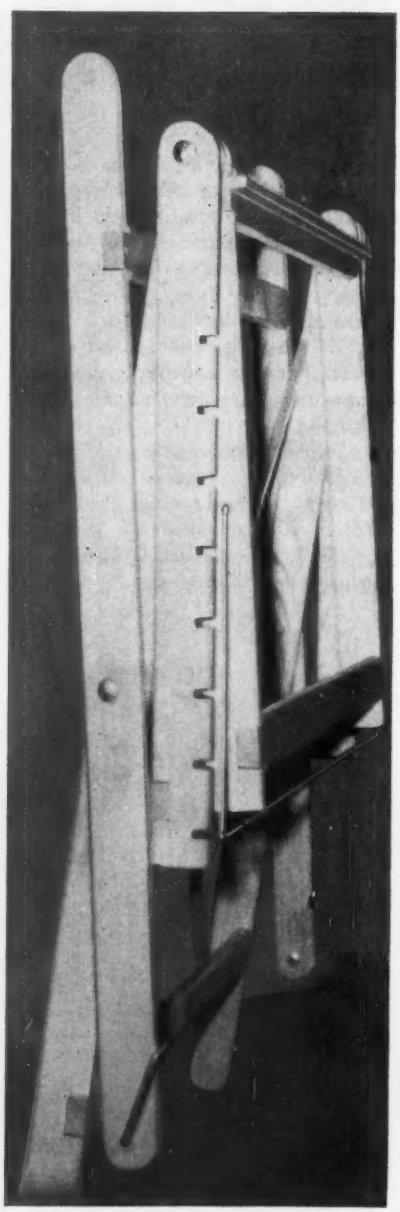
HERE is a portable drafting table that is an excellent project for students beginning machine woodwork. It involves basic procedures on several machines, including drill press work, bandsawing, dadoing, shaper or router operations, countersinking, and machine sanding. It also provides experience in figuring materials and costs from a working drawing and it presents the students with a number of varied problems in layout. The use of both metal and wood makes this an appropriate and worthwhile project for the general shop.

A recommended procedure is to first rip all surfaced stock to width, cut all pieces requiring square ends to length, then lay out all hole, point, and radii positions.

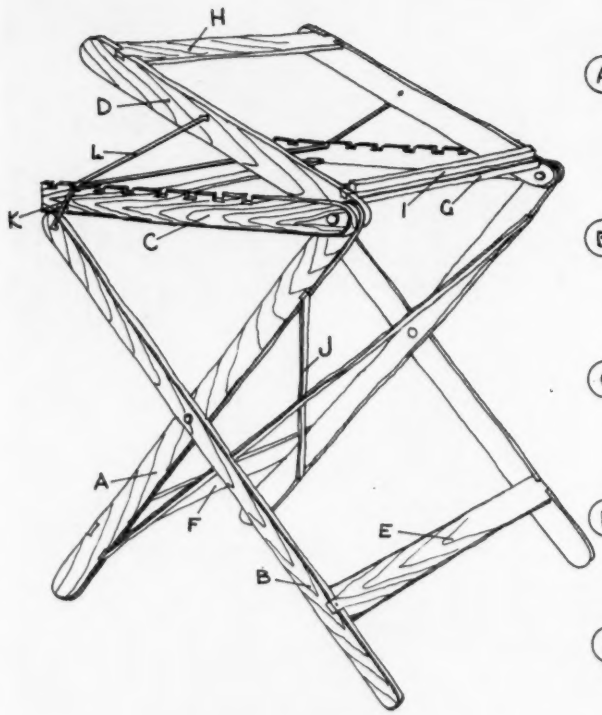
Groove part G to take part I, then shape all curved parts before making remaining joints. Make all metal parts; lay out, and drill holes for all hardware and fasteners, assemble and finish as desired.

This project has been made in the school shop and has been improved to the point that it is "shop tested." The table is light and easily carried, yet it is strong and rigid when in position for drawing. It may be lowered for use from a sitting position, raised for drawing while standing, and the work surface can be adjusted to the preferred work angle. ★

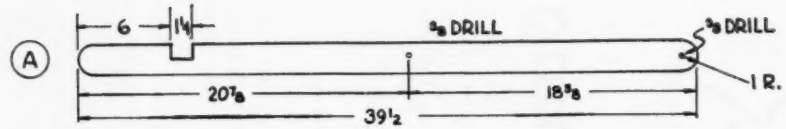


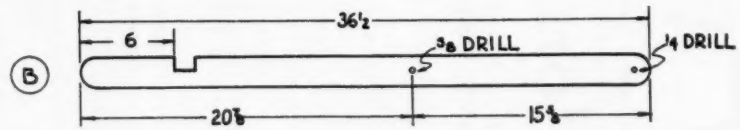


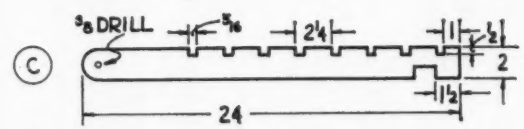
Left: Table erected in drawing position. Supporting rod rests in notched rails to give wide range of adjustment. Right: Table folds into light compact unit for ease of transport or storage.

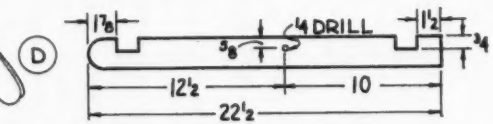


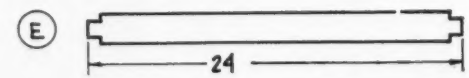
PART	NO.	DESCRIPTION
	2	5/8 WASHERS
	10	1 WASHERS
	2	1/2 NUTS
	2	3/8 x 2 1/2 CARRIAGE BOLTS
	2	3/8 x 3 1/2 CARRIAGE BOLTS
	10	1 1/2 x NO.8 F.H. SCREWS
L	1	1/4 x 49 1/4 C.R.S.
K	2	1/4 x 7 3/8 C.R.S.
J	2	3/8 x 3/4 x 31 3/4
I	1	3/8 x 1 3/8 x 21
G·H	2	3/4 x 2 x 21
F	1	3/4 x 2 x 22 1/2
E	1	3/4 x 2 x 24
D	2	3/4 x 2 x 22 1/2
C	2	3/4 x 2 x 24
B	2	3/4 x 2 x 36 1/2
A	2	3/4 x 2 x 39 1/2

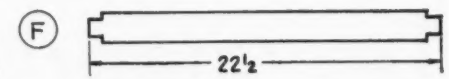


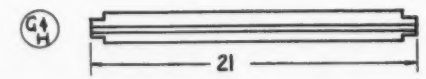


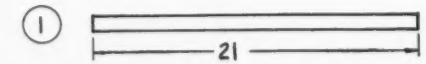


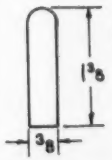












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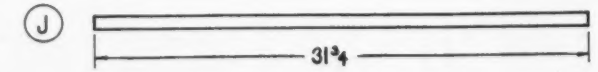

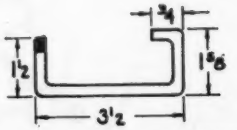

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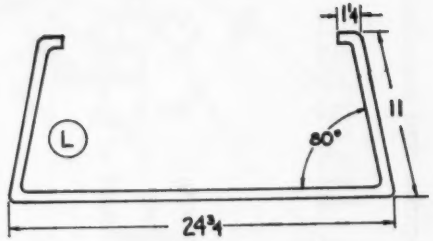
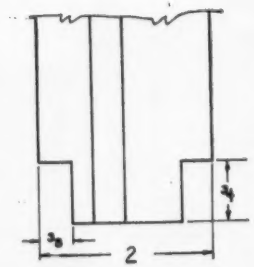




Space age metalworking

Shop-made unit employs force from blank 38 cartridge to demonstrate explosive metalforming — metalworking's "hottest" new technique which holds great promise.

Explosive Metalforming

By Leigh F. Croskrey

Hughes Junior High School, Long Beach, California

FORMING metals to desired shapes by controlling forces generated by explosive charges has become one of metalworking's "hottest" new techniques. It is not a new discovery. An English patent shows that the technique had been evaluated and judged to be of some merit in 1898. Little was done, however, in the way of developing and applying the technique until the metal requirements for engineering in space research forced a quest for a method of forming the new alloys and metals used in space vehicles.

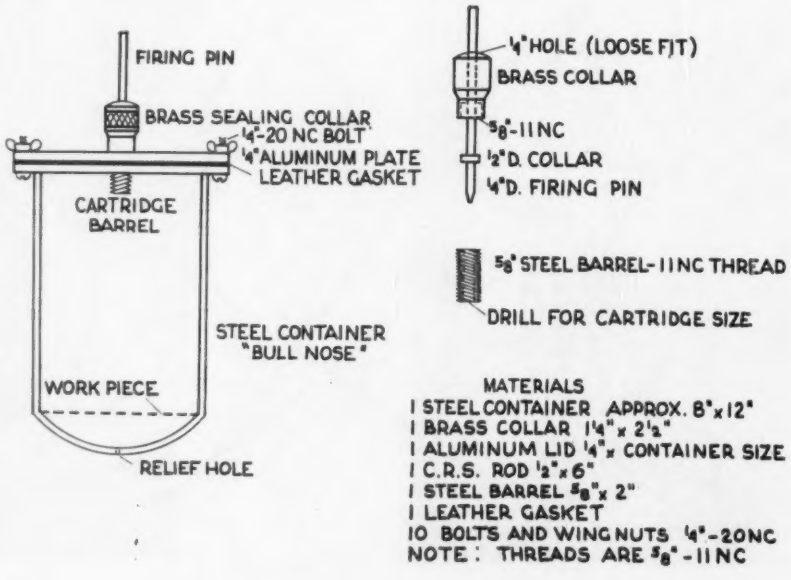
What does this have to do with metalworking in a school shop? Several things. One, I became interested as a result of reading an article published in the June, 1960, issue of SCHOOL SHOP that was written by John E. DeWald, of the Engineering Design Division, U. S. Army Ordnance. A further exploration of the subject led me to the knowledge that many large industrial firms are carrying on intensive research and development programs. The major activity is in the area of space research, but several patents have already been granted for tools such as cable cutters and splicers, hole punchers, and similar devices—all employing the principle of explosive force.

On the premise that what is research today may be practice tomorrow, and believing that students should at least be made aware of what is taking place in research, I prepared equipment for demonstrating the process of forming metals by explosive forces. It is a "natural" to stimulate student interest and inquiry while it teaches a great deal of math and science, plus a number of skills.

The basis of the explosive-forming technique is simple. It is quite the same thing as setting off a firecracker under a tin can. The tin can usually assumes a different shape as a result of this process, as any man who was a boy before antifirecracker legislation became prevalent will attest. If dies are prepared to control the shape of the metal while it is experiencing the force, and the complete operation is contained in a chamber of sufficient strength to allay the fears of even the most timid, then we have a basic description of the process.

After much study and preparation, I built a demonstration unit and performed a demonstration in my shop, using a blank 38 caliber cartridge for the explosive charge.

(Continued on page 54)



And one year later, a second report about

Industrial Arts for the Academically Talented

By George Storm

Chairman, Industrial-Arts Department, Fullerton, California, Union High School

THIS is a second report of a special industrial-arts course offered at Fullerton High School. The program was first reported in the September, 1960, issue of SCHOOL SHOP.

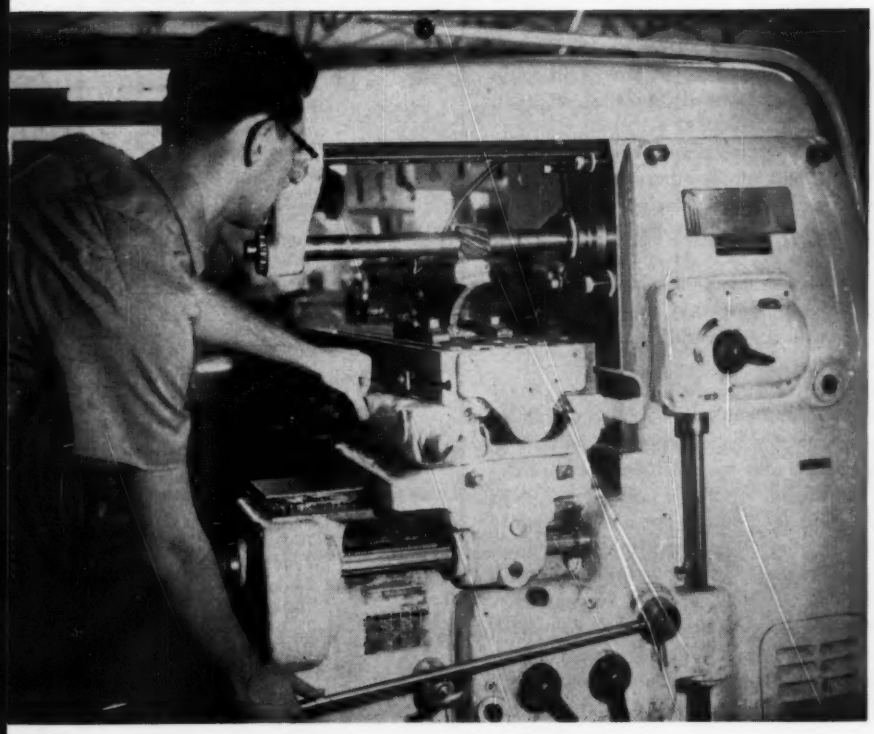
This course represents a new and different approach in presenting industrial arts to academically talented high-school students. The students are offered standard experiences with hand tools and machine tools as well as instruction in industrial methods and processes. Students are expected, however, to develop their class-built projects into hypothetical commercial enterprises.

All of the students are enrolled in physics. Consequently, their projects are largely pieces of science-demonstration equipment.

The projection into "hypothetical commercial enterprises" is accomplished by requiring a series of reports from the students. These reports detail various phases of manufacture of their product. Some of the subjects described in these reports deal with the types of hand tools and machine tools required for manufacture of 300 items of the project on a weekly production basis; lay-out of the plant for producing such items, which is reported during the class unit on architectural drafting; and personnel needs as well as budget estimates for the make-believe business venture.

This course is not an "industrial-arts research laboratory," not an "electronic workshop," not a "preengineering machine shop," not a "do-it-yourself shop" with the instructor standing by to help future scientists with their science projects. Rather, it is a course that conforms to the accepted objectives of industrial-arts education, but which is specifically designed for the bright, above-average, high-school senior. It is based on the premise that practical manipulative experiences give a basis for a better understanding of the theoretical phases of technical education, as well as provide an opportunity to apply mathematics, science, and other subject matter.

"The students are offered standard experiences with hand tools and machine tools as well as instruction in industrial methods and processes."



In the article that appeared in SCHOOL SHOP it was reported that Stanford University accepted our course as part of its academic requirement. Since then, a number of other engineering colleges have let us know their reactions to what we are doing. A few of these reactions follow:

"This course will have numerous unexpected values. For example, in promoting student initiative and developing the ability to carry out a project by one's self. . . ."

"We are certain that these students will have a much better picture of today's technology and the need for an adequate preparation in mathematics and science. . . ."

"Experience in manipulating materials provides a basis we no longer can give adequately in college, but which improves the student's understanding of his college courses. . . ."

"We feel it is highly desirable for students entering engineering to have a background in the industrial arts because there is no place left in the university program for such training. . . ."

"I am highly in favor of the type of course that you are giving. I think it is important that this kind of material should be given at the high-school level. . . ."

"The manner in which you give this material sounds very stimulating and should awaken a great deal of interest on the part of high-school students in the field of engineering. . . ."

"Inclusion of emphasis on oral and written reports seems to me a very good feature. . . . An opportunity for high-school students to begin writing and speaking on technical subjects seems to me a desirable, early introduction to this important attribute of a successful engineer."

"Let me say that we applaud what appears to be a most worthy effort to

do something really worthwhile for the gifted student. We should be very happy to have applications from students who have been through this program."

The above excerpts are from comments made by administrators and teachers in California colleges and universities.

Three schools did, however, suggest that we choose a different title for our course because of a conflict with a course they offered in physics. We have, therefore, changed the title of our offering from "Engineering Mechanics" to "Preengineering Industrial Arts."

Many readers of SCHOOL SHOP, following publication of the first report, have written to us requesting more information concerning the program. The following are our answers to the questions most often asked.

How do you select students for this class?—Successful completion of chemistry in the 11th grade is the first step. The chemistry teacher prepares a list of his outstanding students during the second semester of his course. The industrial-arts instructor then can call a conference of the recommended students, acquaint them with the aims of the course, and present a brief description of the types of activities that will be done.

". . . it is a course based on the premise that practical manipulative experiences give a basis for better understanding of the theoretical phases of technical education, as well as an opportunity to apply mathematics, science, and other subjects . . ."

What kinds of instruction sheets are being used?—At present, detailed instruction sheets are distributed for each of the eight required reports, for notebook preparation, and a check list for the "floor plan" report.

Instruction sheets are being prepared for each of the machine-tool and hand-tool operations. They are scheduled to be ready for this school year.

How do you grade in a class of this type?—As can be expected from a homogeneous group of bright lads, the range between the highest and the lowest scores is very short. Most of the test scores, consequently, are *A*'s and *B*'s. It would be unrealistic to use the normal curve. The quality of the assigned, and required, reports is proportionately high. Normally, grades below *B* are rare. Any report or assignment that is handed in later than the deadline is automatically graded down to a *D*. Extensions for legitimate reasons, illness for example, are granted.

Do you have any unique discipline problem?—To this question we can answer, "practically none." The students are too eager to get their work done. Even when the course was first offered in four adjacent shops, the discipline problems were nonexistent.

What type of facilities and equipment would you recommend for the course?—The recommended specifications for Group I shops, according to the *Guide for Planning and Equipping Industrial Arts Shops in California Schools*, published by the California State Department of Education in 1959, are:

A rectangular shaped open shop area with a width-to-length ratio of approximately 2:3 and enclosing 3,000 square feet of space. Auxiliary rooms should include: project storage, supply storage, a finishing room, and an office. The lecture-demonstration area, plus a reference library, should be parts of the open area.

The recommended list of equipment that accompanies this report will raise some interesting comments from administrators who have a "fiscal complex." Admittedly, the initial cost of equipping this facility is high, but a careful study of the list will reveal that this shop, with its variety of tools and equipment, can be easily used to its maximum by most progressive, high-school, industrial-arts departments. Comprehensive high schools that are initiating technology

(*Continued on page* 50)

No.	Unit	Description
1	each	Bench, molding
6	"	Bench, 4-station, with woodworking and machinist vises (lockers below)
1	"	Bender, iron
1	"	Brake, box and pan
1	"	Buffer, bench or pedestal, 7"
1	"	Compressor, air
2	"	Drill, electric, portable, ¼", ½"
2	"	Drill press, floor, 17"
1	set	Electroplating unit
1	each	Folder, bar
1	"	Forge, gas-fired
1	"	Furnace, heat-treat
1	"	Furnace, crucible
1	"	Furnace, soldering
1	"	Generator, signal
1	"	Grinder, bench
1	"	Grinder, pedestal
1	"	Grinder, portable
1	"	Grinder, surface
1	"	Gun, spray
1	"	Hack saw, power
1	"	Jointer
1	"	Kiln, enameling
2	"	Lathe, engine, 12"
2	"	Lathes, wood, ironwork, universal
1	"	Microscope, bench
1	set	Machines, hand (turning, burring, edging, wiring, crimping and beading)
1	each	Metalloscope
1	set	Meters, amp, ohm, volt
1	each	Milling machine, horizontal
1	"	Mitre box
1	"	Nibbler, portable (9 gs, mild steel cap)
1	"	Oscilloscope
1	"	Oven, plastic-forming
1	"	Plate, surface, 12"
1	"	Pump, vacuum
1	"	Regulator, air
1	set	Rotary file
1	each	Rolls, slip and forming
1	"	Router-shaper
1	"	Sander, belt, portable
1	"	Sander, disc, portable
1	"	Saw, band (comb., wood-metal)
1	"	Saw, band (plastic)
1	"	Saw, circular
1	"	Shaper, metal
1	"	Shaper, wood
1	"	Shears, ring and circle
1	"	Shears, squaring
1	"	Shears, uni., portable
1	"	Stake plate, mounted
1	set	Stakes
1	each	Welding, arc, unit ac-dc
1	"	Welding, oxy-acet., unit
1	"	Welding, M.I.G., unit
1	"	Welding, spot, unit
1	"	Welding, T.I.G., unit
1	"	Tester, Brinell
1	"	Tester, fatigue
1	"	Tester, guided bend
1	"	Tester, impact
1	"	Tester, Rockwell
1	"	Tester, sclerometer
1	"	Tester, tensile
1	"	Tester, torsion
1	"	Tester, Vickers

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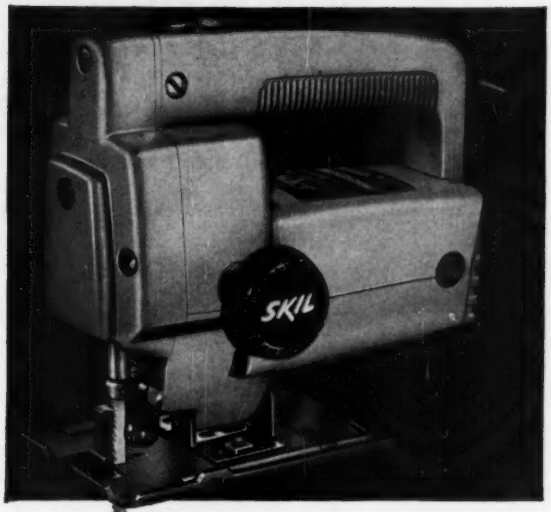

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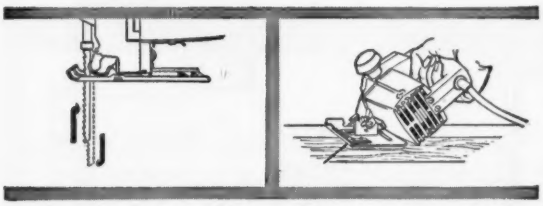

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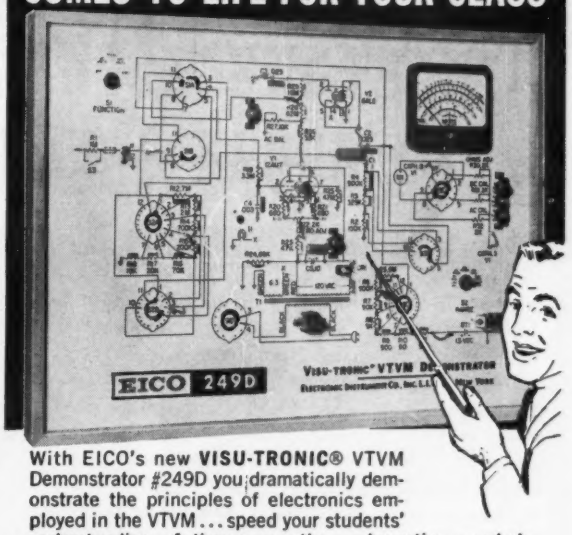

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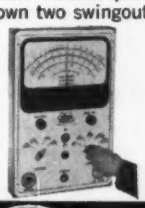

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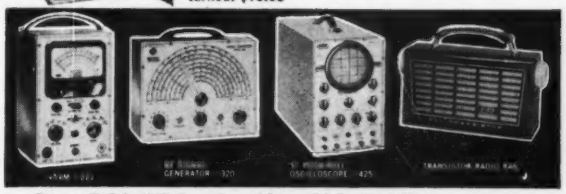

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"*you don't have to agree with me, but...*"

Speaking of Design

By Aarre K. Lahti
Professor of Design, University of Michigan, Ann Arbor

Q. Many industrial-education teachers feel that since they are not "art" people, design is not in their province. How do you feel about this?

A. "I think that if we look at design as problem solving, and forget all about the hocus-pocus that is associated with it, design becomes reasonable. Let me say that my primary concern is with the sensory aspect of design. In other words, how does a thing look, how does it sound, how does it feel, and, even, if I were designing a metal spoon, I would be concerned with the taste and the smell of the metal."

Q. Let's talk about a real design problem—a picture frame—and some of the design factors that are involved in designing it?

A. "The picture frame has to trim the edge of the picture. It has to be a transition between the picture and the wall, a structure for holding an assembly which might consist of a glass, a mat, the picture, and the backing paper, and to hold this assembly so that you can hang it from a wall.

"Here are some of the design factors I must consider. The relationship between the picture, the frame, the wall, the room, and the space. Now, the picture comes first, not the frame, so you have to keep in mind that it is a picture that you are showing and that the frame is secondary. I would like to make that frame as inconspicuous as possible."

Q. How would you design this frame?

A. "Now, first, I am a lazy person. I do not like to fuss. I don't like to get special set-ups, special tools. I want to make the thing as simply as possible. I feel that if you use the simplest tools and simplest materials, the chances are you will get a better design.

"Now, for materials I would use pine, basswood, poplar, or any material that is easy to glue and material which is paintable. I would not make a picture frame out of attractive natural wood because in most cases it would attract too much attention to itself. You can't control its color and the darkness of it so that it does a job of becoming a transition between the wall and the picture. So, I would use these simple, easy-to-use materials and paint the frame to suit my purpose. As for materials, I would use 13/16" materials. In other words, 1" dressed stock. I wouldn't bother with thicker materials, but I would design that frame so that I could get it out of that thickness of material. This kind of material is less expensive, more available, easier to use.

"And, as for tools, I would use a circular saw with a hollow-ground planer blade. This way I can get a smooth cut that I do not have to plane. I would use no dado heads. I would use no shaper knives because it takes too long to get them set up and then you fall into stereotypes.

"In gluing, I would use the old-fashioned string-and-drum method of tightening and not bother with clamps. This does an excellent job — and quickly. Furthermore, you do not have to have special tools.

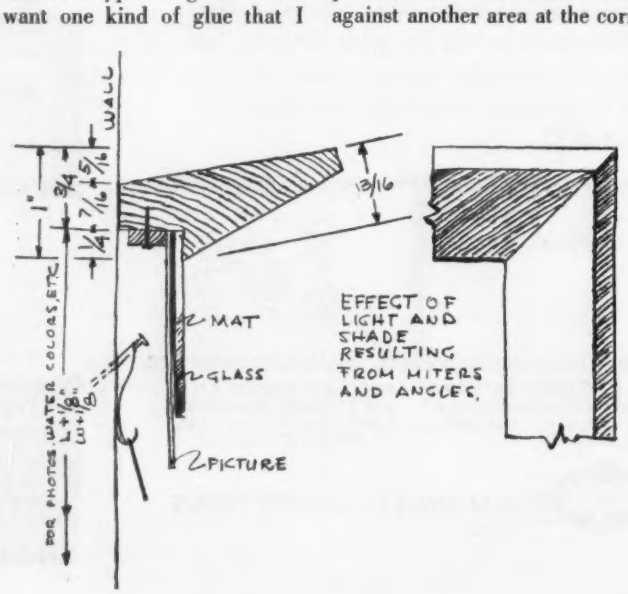
"As for glue, I would use waterproof glue because I do not want to have two or three different types of glues in the shop. I want one kind of glue that I can use inside or outside, and, incidentally, I never order interior-grade plywood — only exterior. I don't want to mark scraps of plywood as to whether they are interior or exterior.

"Now from the freehand drawing I made, and most of the time I make my drawings freehand because getting the tools out for drafting means that you have to fuss with more equipment; then pretty soon you are making straight lines because your tools make straight lines, and you make 90° angles because your tools make 90° angles and you make 30° because they make 30°. You will note I would set the picture far enough into the frame from the back so that the picture can lie flat against the wall. If it is for a water color, the depth need not be more than ½". If it is an oil painting on a stretcher, it would have to be greater. If the picture is a water color or a print, I would see that the opening is about ⅛" larger than the picture because few pictures are exactly square.

"If it is for an oil painting, I would make the opening ¼" larger than the length or width.

"I would not make the outer edge of the frame 90° to the wall for the reason that most of your woodwork comes out 90° and, therefore, the frame begins to compete with the woodwork. I would make it just a little less than 90°, and in this way, the frame becomes a bit perky and sassy. It seems to be just slightly free of the wall. If you made a flat frame against the wall it would look too much like a bathroom-mirror frame.

"The view at right below shows the shade effect created by the various planes, with one dark area playing against another area at the corners." ★



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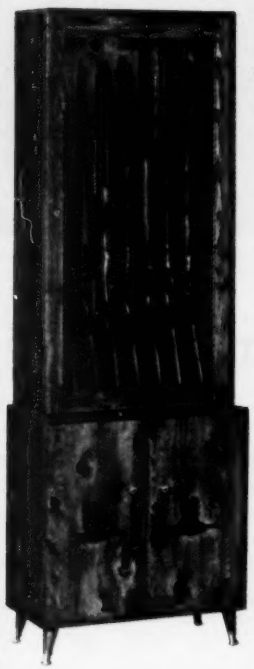
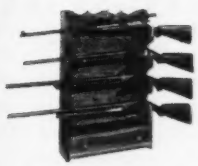


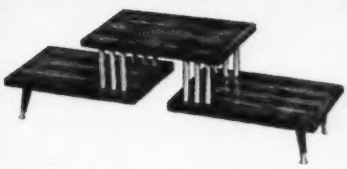
GUN CABINET NO. 707

The knotty pine "Pioneer" gun cabinet holds eight guns. Bottom storage compartments for ammunition and other equipment equipped with two locks. Brass ferrules on legs. Overall size 27" wide, 15½" deep, 83" high. Glass for door not included.



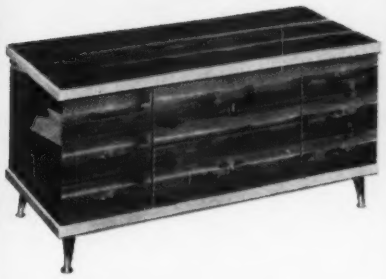
GUN RACK NO. 404

This four gun rack with full width drawer for ammunition and cleaning gear is all cedar. Comes complete, ready to assemble with all screws, brass pulls and safety lock. 32" high, 21½" wide.



COCKTAIL TABLE NO. M-17

Solid cedar. Top is 20" wide, 44" long. Stands 15" high. Complete with all hardware including brass ferrules for legs.



GENUINE CEDAR CHEST NO. 909

The "Astronaut" with simulated drawers and brass pulls has a handsome, modernistic style. Cedar legs have brass ferrules. Size 20" wide, 46½" long, 21" high. Five ply top and front.

LIMED OAK CHEST NO. 999

The "Rocket" limed oak chest has a cleverly designed front of simulated drawers with attractive brass pulls. Modernistic legs with brass ferrules. Size 20" wide, 46½" long, 21" high. Five ply top and front.

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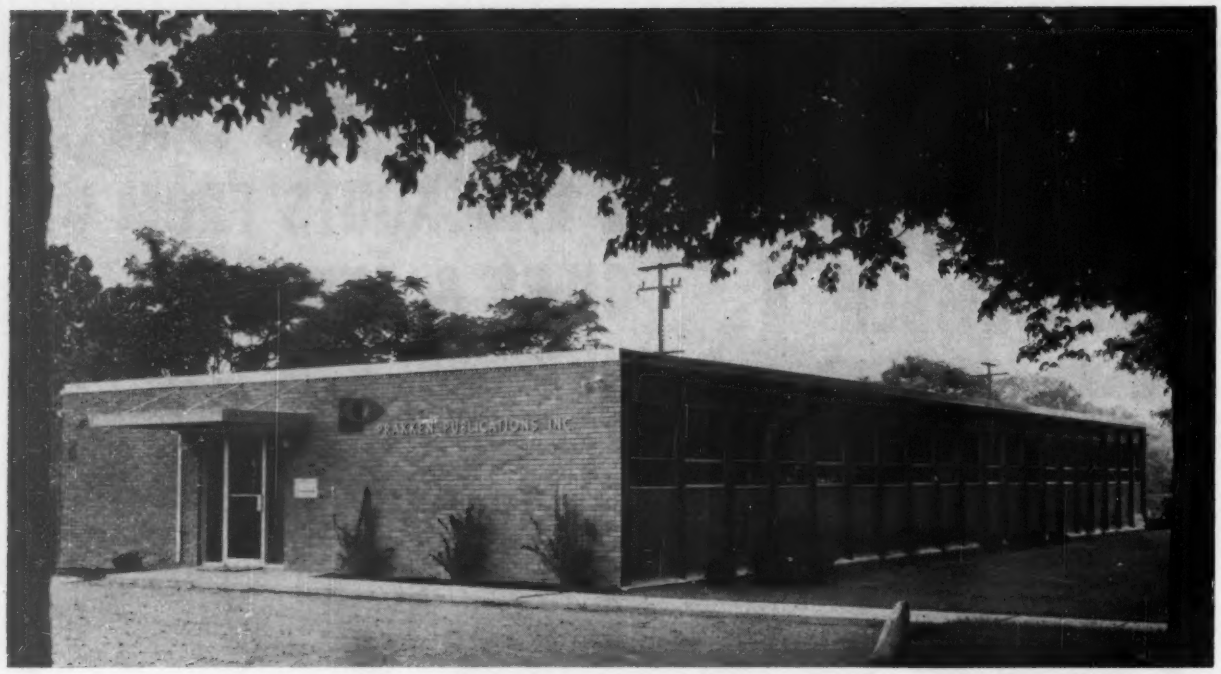

School Shop's New Home

LAST May the staff of SCHOOL SHOP moved into the new quarters of Prakken Publications, Inc., at 416 Longshore Drive, Ann Arbor, Michigan. The new building was designed for publication office purposes and houses the staff of *The Education Digest* as well.

Containing 4,000 square feet of space, the new building is modern in every respect, including air conditioning. It is located only a five-minute drive from the business center of Ann Arbor on a hill overlooking the Huron River valley.

Each department has its own office area and the editors have individual offices. Storage and mailing areas are also provided. A small kitchenette is used for the proverbial coffee break and for lunch facilities. Fluorescent lighting with high candle power and sound-absorbent ceilings make for comfortable working conditions. An extensive reference library is also maintained.

The editorial, advertising, and circulation activities of the two magazines as well as the book publishing operations of the company are carried on in the new building, but the actual printing of the magazines is done elsewhere. SCHOOL SHOP is printed at the Barrington Press, Barrington, Illinois, while *The Education Digest* is printed by the Cross Printing Co., Oxford, Indiana. Advertising sales offices are maintained in Chicago, New York, and Los Angeles.

All correspondence should be addressed to the new location, 416 Longshore Drive, Ann Arbor, Michigan.

Visitors are welcome at any time. ★

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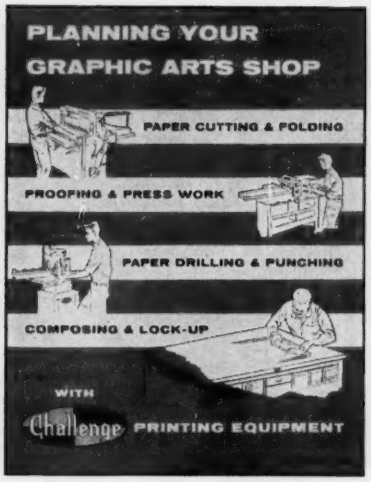

NEW GUIDE BOOK

Helps You Plan Your Shop Equipment Needs

School supervisors, shop instructors, and others interested in planning new graphic arts departments or improving present facilities will find this new booklet a useful guide to the selection and ordering of Paper Cutting, Proofing, Paper Drilling or Punching, Composing and Lock-up Equipment, and Supplies. Write for your copy today. Address:

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Also available—the Model 3300 with special disc brake and automatic 15° indexing—slightly higher in price.

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A great many of the products advertised in this magazine are available to you at Dealer's Wholesale Prices.

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NEW CATALOG AVAILABLE SOON

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Built around a post

A Planning Center

By Robert R. Shields
Professor of Industrial Arts, San Francisco State College, California

The upper shelf of this planning center revolves and it is a good attention getter.

ONE requisite of good organization is planning. Students, when provided ample space, materials, and equipment, tend to do a better job of planning.

Many laboratories and shops frequently are limited in available space for planning centers. This writer "found" space around one of the main supporting posts of the building.

Snug fitting angle-iron, clamp-type collars with wood softeners, pipe bracing, 2″ x 4″ table bracing; plywood-and-formica top made a sturdy smooth work surface. A basic tool panel for sketching includes space for a T-square, paper, pencils, scales, compasses, triangles, and a pencil sharpener. The other three sides of the post are covered with plywood and cork which makes a display area for current-event topics, notices, etc.

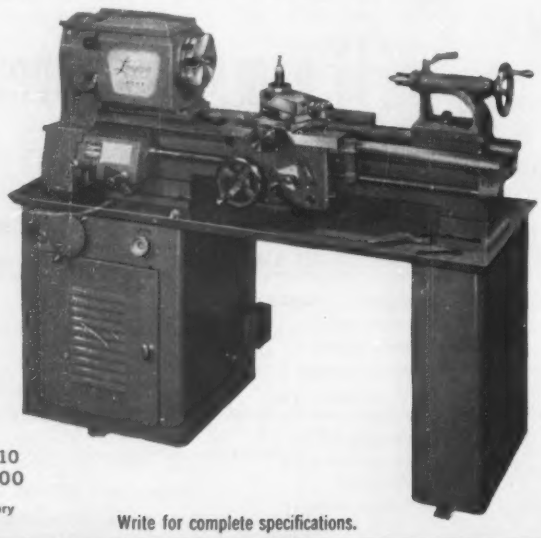
The top shelf is made of plywood with a formica edge covering. This shelf is supported by an additional angle-iron collar to which supporting arms for ball-bearing rollers have been added. These allow the "Lazy Susan" shelf to revolve. A piece of ¼″ plywood cut to length and kerfed for bending is fastened to the inner edge of the circular shelf for a driving surface. An electric turntable and motor from a record player, fitted with a piece of air hose over the shaft, serves as the power unit for continuous slow rotation of the upper shelf.

This "animated" shelf is an attention getter for project display, book or periodical storage, and similar usage.

The entire unit was constructed in split sections to make it portable, and at the same time, to avoid major building modifications or changes. ★

NEW! Logan 14" LATHES BEST DOLLAR VALUE IN THE LATHE FIELD

These new Logan 14" swing lathes are **DEPENDABLE.** Their capacity permits a broad range of machining operations. They have a 14⅝" swing over bed, a swing over saddle cross slide of 9", and a center distance of 28". Logan lathes are **ACCURATE.** The ball bearing spindle has a 1⅜" hole and a draw in collet capacity of 1 1/16". The variable speed drive (40 to 1400 RPM) adjusts while running —no need to stop and shift belts! Also, the two V-ways and flat ways are precision ground. Logan 14" lathes are **RUGGED.** The 10" wide and 56" long lathe beds are braced by oversize ribs to withstand torsional stresses. The Logan 14" lathe is your best dollar value. No other lathe in this price category offers you this same big work capacity with variable speed drive.



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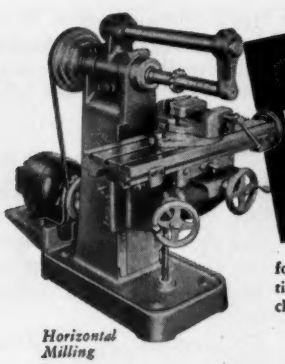


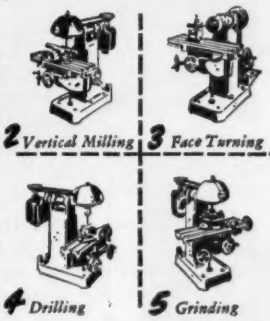
One BENCHMASTER ANSWERS Five EVERY-DAY SHOP REQUIREMENTS

Your little Benchmaster pinch-hits for almost any tool in the shop, saving time, eliminating the need for extra machines, cutting your costs to the bone.

Horizontal Milling

With its two interchangeable spindles, *Benchmaster* mills both HORIZONTALLY and VERTICALLY; serves as a GRINDER, DRILL PRESS or LATHE. In fact, BENCHMASTER is almost a complete shop in itself!

Good, husky spindle construction with Timken Tapered Roller Bearings is one answer to Benchmaster's extra versatility. Built to .001" tolerance, Benchmasters are precision fitted in every part, assuring surprising accuracy and metal-removing ability —whether it's *milling, drilling, turning or grinding!*



2 *Vertical Milling* 3 *Face Turning*

4 *Drilling* 5 *Grinding*

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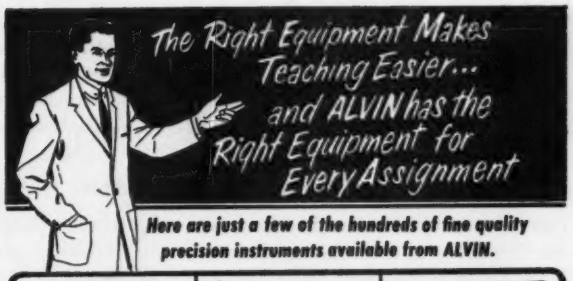

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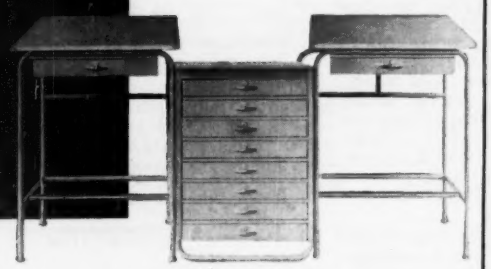

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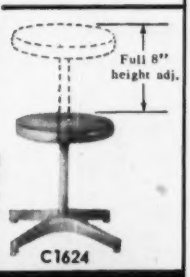
"Board and T-Square" stored in its individually locked 20½ x 26½ x 2¾" drawers. Accommodates more students with greater convenience. Extra boards rest on rails with ample space below for instruments in each drawer. "Quick lock handle adjustment" offers fast self-locking positioning of tops. Also available as a dual model.



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happenings in industrial education

New Industrial-Arts Bulletin

THE Illinois Curriculum Program, under the direction of Woodson Fishback of the Office of the State Superintendent of Public Instruction, plans to begin publication of an industrial-arts bulletin next year.

The bulletin will cover the field from junior-high through senior-high schools, presenting information on new philosophies and trends in industrial-arts education to teachers and administrators in Illinois schools.

Receives G-A Award

RICHARD J. HOFFMAN, professor of industrial arts, printing management, Los Angeles State College, has been awarded the 1961 Elmer G. Voight Award "for exemplary service in the field of graphic-arts education." Hoffman, who received the award in February, has won prizes in typographical contests in national and international competition and has authored several laboratory workbooks.

Grant to Dunwoody

THE William Hood Dunwoody Industrial Institute, Minneapolis, Minn., has received a five-year, $100,000 grant from the Ford Foundation to help support the international services division of the institute.

Joseph R. Kingman, Jr., president, in announcing the grant in March, said it is to be used to develop the school's international technical training services.

The school's international services division was created in 1953 to assist underdeveloped nations in initiating or improving technical education offerings. K. N. Rao heads the division. Since 1953 Dunwoody has administered two major Ford Foundation programs in Indonesia and Burma and a third, smaller program at Lodhipur Institute, India. At present Dunwoody has 13 students from Burma and 25 more from 14 other foreign countries.

New Publications

A NEW industrial-education publication, *The C.C.I.A.T.E. Journal*, published by the California Council on Industrial Arts Teacher Education, made its debut this spring.

The new journal, which is designed to disseminate the results of research in the field of industrial education, with particular emphasis to those factors bearing on industrial-arts education, is edited by Geoffrey B. Noakes, Department of Industrial Arts, Fresno State College, Calif.

Vol. 1, No. 1 issue of the Journal, the Spring 1961 issue, consisted of 24 pages. It included a list of thesis topics and

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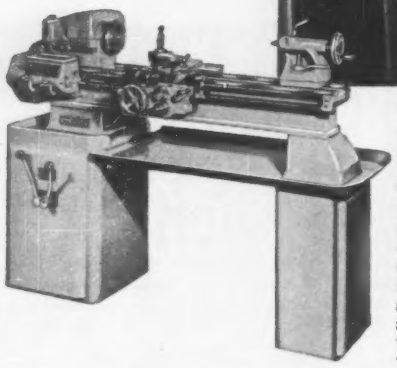
It only takes one good Milling Machine and a capable Shaper to triple the value of your shop course



No course in shop practice can be complete without basic instruction on the milling machine and the shaper.

For this no other units equal the size "0" Sheldon Milling Machine with its hand and power table feed, quick-change gear box, variable speed drive, back geared unit, and interchangeable vertical milling head attachment. No other shaper is better suited for class work than the ample size Sheldon 12" Back Geared Shaper with its large capacity, long stroke, variable speed drive, weight and accuracy.

These are standard machine tools with which you can teach modern methods and tool performance—— full powered industrial tools that can give your students the "feel" experience and satisfaction of adult work.

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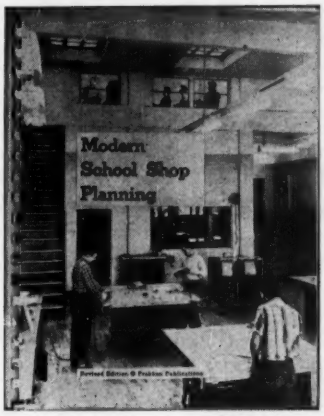
The new and enlarged third edition of

Modern School Shop Planning



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More Pictures . . . . More Pages . . . . More Ideas

10,000 copies of the first two editions of this book have already been sold. They have been used by shop teachers and administrators and school architects in planning new shops, or remodeling present shops. They have been used as textbooks on shop planning in more than 75 teacher-training institutions.

The success of this book is due to its practical approach, its combination of theoretical principles with specific, detailed help in planning. It includes plans, specifications, pointers, and examples of new shops gathered from authoritative sources throughout the United States.

Included among the contents of the book are: Principles of good shop planning, safety factors in planning, standards for physical facilities developed in a research study, planning for storage facilities, and specific suggestions for planning the general shop, the automotive shop, the drafting room, the electricity and electronics shop, the graphic-arts shop, the machine shop, the metalworking shop, and the woodworking shop.

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"Yankee" Spiral Driver
Finest tool of its type. "Quick-Return" lets you drive or remove the longest screw while using only one hand. Spring returns the handle after each thrust. 20" length with bit extended; 14¾" with bit closed.

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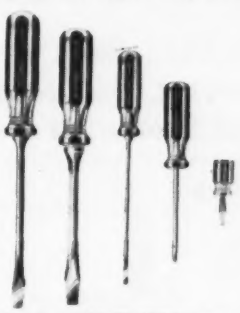
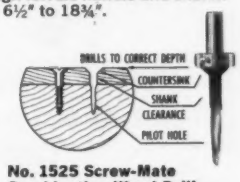
The standard of comparison for more than forty years. Blade, shank and head forged from one piece of alloy steel. Blade extends through hardwood handle, anchored by two projecting wings and a rivet that passes through ferrule handle and shank. Machine crossground tip. Length: 6½" to 18¾".





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Does 4 jobs in one operation. Drills to correct depth. Can be used in chuck of hand or power drill, or drill press. ¼" shank. Will not split wood.

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7-inch Woodworkers' Vises, with 2½ inch left side clamping surfaces streamlined... compact... ideal for shop use

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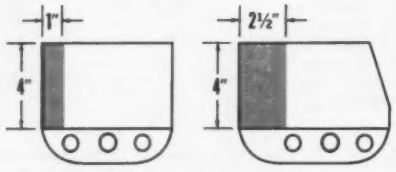
Maximum Clamping Area... More Clamping Strength plus all of the exclusive, time-tested features of Columbian Woodworkers' Vises



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Choose from these 4 "Wide-Side" models!

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V-7CDW	4 x 7	9	Dog	Solid Nut	Wood	29
V-7CDT	4 x 7	9	Dog	Solid Nut	Steel	30

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Manufacturer of Columbian Levels

research studies as well as several articles.

Another state — Nebraska — also has made plans to start a publication. At the annual meeting of the Nebraska Council of Industrial Arts Teacher Educators held in Kearney last spring, plans were made for a publication with information pertinent to industrial arts in that state. The publication will be sent to all industrial-arts teachers in the state.

At the Kearney meeting, Kenneth F. Carlson, associate professor of industrial arts, Nebraska State Teachers College, Kearney, was named president of the Council for 1961-62.

Missouri Officers Named

ROBERT KAINTZ of O'Fallon Technical High School, St. Louis, was elected 1961-62 president of the Missouri Industrial Education Association at its spring conference. David Hart, Mexico Senior High School, was named vice-president.

College Advisory Council

An Advisory Council for Industrial Arts at The College of Education at Oswego, N. Y., was formed last spring.

The Council, composed of three representatives from management, three from labor, three from high-school guidance departments, a public-school administrator, and members of the college faculty, was organized to explore the need for a permanent organization for mutual exchange of information and for discussion of problems on education-industry relationship in our changing culture. The Council met for the first time during the college's annual spring industrial-arts conference in May.

"Good to see you again, Mr. Spencer."

Plan State Study

PLANS for a state-wide study of the industrial-arts curriculum in Oklahoma have been initiated through joint efforts of the Oklahoma Council on Industrial Arts Teacher Education and the Oklahoma Industrial Arts Association.

The position of industrial arts in the state in terms of scope, content, organization, activities, and the implications of current trends for the teacher-training institutions will be studied. Alvin White has been named chairman of this study.

Six subcommittees have been named to examine the industrial-arts subject areas to consider reformulation of objectives, needed revisions in subject areas, identification of areas receiving either excessive or inadequate emphasis, and emerging trends. Chairmen of these subcommittees are: Fred R. Hoy, metals; Troyce D. McGovern, electronics; C. L. Hill, drafting; L. H. Bengtson, woodworking; Ralph A. DeWeber, power; and C. L. Lombardi, industrial crafts.

Fall Conferences

SEVERAL industrial-education conferences highlight the fall schedule. Among them are the following:

Stout State College, Menomonie, Wis. —The eighth annual industrial-education conference will be held Sept. 22. Among the topics to be discussed are: "High-School Teachers and the Technology Program," "The Place of Amateur Radio in Industrial Education," "What Industry Expects of High-School Graduates in the Drafting Area," "Molding Plastic Foam," "Eutectic Welding Alloys," "Planning and Producing 2 x 2 Color Slides for Technical Teaching," and "Engine Analysis with Anal-O-Scope."

Four-State Conference on Industrial Education. — The annual Four-State Conference, to be held Oct. 6-7 in Pittsburg, Kan., will have as its theme "Quality Education for Business and Industrial Development." Among the topics to be discussed will be "Employe Qualifications and Background for Industrial Development" and "Contributions of Industrial Arts to Industrial Development." Demonstrations by master teachers and craftsmen are included in the conference program.

College of Education at Buffalo, N. Y. — The industrial-arts fall conference, to be held Oct. 20, will feature two talks by George S. Counts, professor of education, Michigan State University. He will speak on "The Challenge of Soviet Education" and "The Technological Revolution and Its Relationship to the Need for Excellence." Theme of the conference is "Quest for Quality."

Montclair State College, Upper Montclair, N. J. — A conference on "Industrials Arts and Contemporary Society" will be held Oct. 28. Panel discussions will be conducted on these topics: "Automation and the New Technology" and "Analysis — New Curriculum Directions."

Help Wanted

ARE you a radio ham? Does your industrial-education department sponsor an amateur radio station?

If your answer is yes to either of the two questions above, write to Steve Johnson, Supervisor, Industrial-Arts Education, Board of Public Instruction, 1320 Southwest Fourth Street, Fort Lauderdale, Fla.

Mr. Johnson has asked the cooperation of SCHOOL SHOP magazine in obtaining the names and addresses of industrial-arts teachers who are hams and a list of school stations which are sponsored by the industrial-arts departments. He is planning to compile a directory listing the teachers and schools.

To Give Doctor's Degree

TEXAS A & M COLLEGE, College Station, announces it is now authorized to offer the doctor of education degree in industrial education. With the new authorization, made last spring by the Commission on Higher Education for the State of Texas, the college becomes the first institution in the Southwest to offer the advanced degree for industrial arts and vocational education. ★

CONVENTION CALENDAR

Ohio Vocational Association, Southern Hotel, Columbus, Sept. 29-30.
Four-State Conference on Industrial Education, Pittsburg, Kans., Oct. 6-7.
New England Industrial Arts Teachers Association, Hotel Viking, Newport, R. I., Oct. 13-14.
Minnesota Vocational Association, Pick-Nicollet Hotel, Oct. 20.
Industrial Arts Association of Pennsylvania, Hershey, Oct. 20-21.
Oklahoma Industrial Arts Association, Oklahoma City, Oct. 26-27.
Kentucky Industrial Education Association, Kentucky Hotel, Louisville, Nov. 3-4.
Oregon Industrial Arts Association, Medford Senior-High School, Nov. 10-11.
Fall Industrial Arts Conference, Trenton State College, N. J., Nov. 17-18.
American Vocational Association, Kansas City, Mo., Dec. 3-8.

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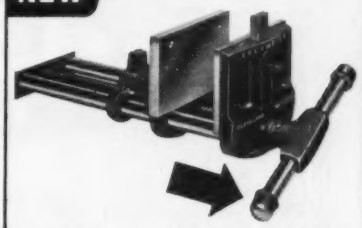

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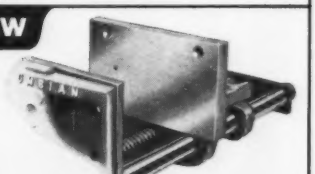

Drilled and tapped for wood faces. Faces can be installed or replaced without loosening vise.

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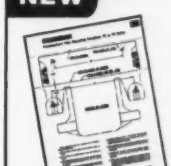

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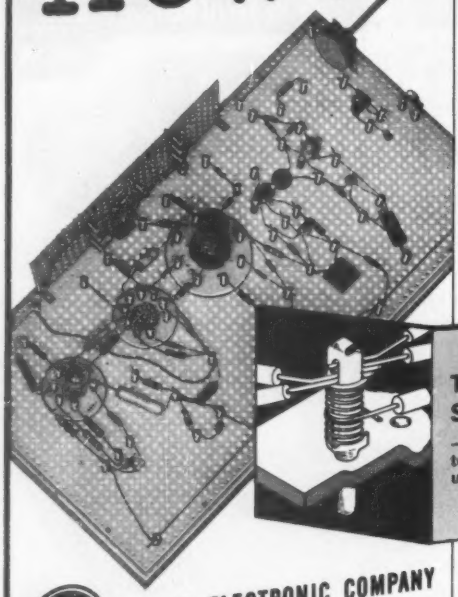

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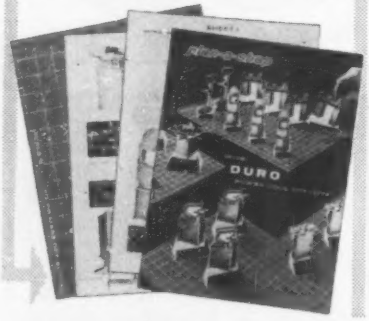
a new way to Plan a Workshop



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Diamond Dust

Abrasive comments from that doughty Scot, Tom Diamond, former head, Department of Vocational Education, University of Michigan, Ann Arbor.

Ask the Man Who Knows

SAM had just been made the woodworking-department head of a new high school. As he became acquainted with his shop and its facilities, he was annoyed to learn that conditions were not as he felt they should be. Gradually, he came to the conclusion that the individual who had planned the shop was uninformed concerning administrative problems of a shop.

During his first week in class, he had encountered a situation which confirmed the opinion he had formed. A truck-load of oak boards had been delivered to the school. Since no provision had been made to receive the lumber directly into the shop, it had to be unloaded at the front of the building. This made it necessary to carry the material through a long corridor to its appropriate resting place in the shop.

The problem of manpower to do the carrying was not acute as he had many stalwart volunteers in his class who were eager to participate in any activity that relieved them from the shop routine. It enabled them to roam at will through the corridors, and it provided opportunities for them to visit with their pals as they ambled back for another load.

The stockroom was located in a corner diagonally across from the doorway leading from the corridor into the shop. This made it necessary to carry the material over the benches and across the working space, which caused the pupils who were working there to be disturbed.

All of this distressed Sam, and what he had to say about the nitwit who planned the building would blister the ears of even an innocent bystander.

During the lunch period, Sam held forth at length on his problem to his friend, the machine-shop teacher. This he did in the hope that his associate would be sympathetic. In this he was disappointed. His friend inquired what he was kicking about. "Why," he said, "What do you think of the problem I have? My shop is next to yours, and I have to transport steel bars over the same route as you have to travel with your lumber."

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The conditions under which Sam and his friend had to work are regrettable, to say the least, but their task of moving material or equipment into or out of their shops is relatively simple when one considers the plight of the teacher in the auto shop. This fellow suffers from complete frustration. He is eager to have his pupils work on a real live project, which means that he would like to bring a car into the shop. Obviously, driving an automobile down the corridor of a school would be tantamount to committing *the* unpardonable folly.

All of this is slightly exaggerated, but it points to a situation which must be considered by school authorities when the plans for a school are being made. In some cases, the shop teacher is given an opportunity to examine the plans before the actual building operations begin, but usually this takes place after the final drawings have been completed. At this point, any suggestions he may offer are apt to be ignored. As a result, the teacher is compelled to accept conditions which make it difficult for him to operate his department efficiently.

Other examples of poor planning became evident to Sam as time passed, and as they appeared, he began to wonder why the school administrator neglected to consult the teachers who were expected to use the rooms and place on them the responsibility of determining what the minimum requirements were for school shops. The administrator would then have the benefit of the best thinking of those men who had had experience operating them. The architect can decide where each shop is to be located. The determination of the facilities to be provided, and their location in each shop, should be the teacher's province. ★

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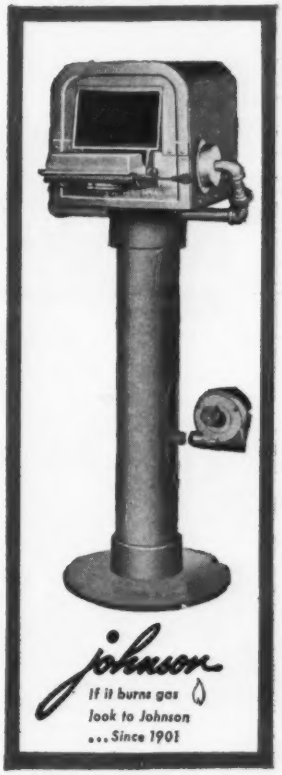

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Write for FREE JOHNSON CATALOG plus information on factory reconditioning your present Johnson Furnaces.

JOHNSON GAS APPLIANCE COMPANY
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Power Mechanics . *from page 23*

breaks a vital part during assembly, he is halted in his work until parts can be secured. In the case of an automobile, a shop stall is tied up so that space becomes a problem.

6. A great deal of time is lost in getting the jobs ready for the beginning of each period.

7. A disproportionate amount of time (noneducational) is spent in cleaning and painting parts.

8. It is difficult to tailor jobs to a classroom period of 45 minutes.

Laboratory-Type Set-Ups: Advantages

1. The equipment is always ready so that the instructor can correlate classroom work with shop activity.

2. The instructor can be assured that each student has similar educational experiences.

3. There is no need to spend time in cleaning grease and grime from parts before taking them apart for study.

4. The project can be tailored to fit a 45-minute period.

5. It relieves the instructor of the responsibility of getting professional work from industrial-arts students.

6. Parts can be stocked before the semester starts to take care of nominal breakage.

Laboratory-Type Set-Ups: Disadvantages

1. The big disadvantage is lack of motivation when students know that the units will never be used in an operational engine. This does not apply, however, when live-type and laboratory-type jobs are mixed; only when laboratory-type jobs are used exclusively.

Recommendations

It is this writer's opinion that a combination of live-type and laboratory-type jobs makes an ideal program. Because laboratory-type jobs can be arranged in a psychological learning order and correlated with classroom discussion and tests, they must be the backbone of the course. Some live jobs must be included to elevate student interest. Live jobs, however, must follow similar laboratory-type jobs — *never precede them*—so that the student has the knowledge necessary to complete the "live" jobs in expert fashion with a minimum of teacher direction.

To make laboratory-type jobs more interesting, at least two automotive-type engines and one small engine should be kept in operating condition for several of the assigned projects. Typical jobs are to adjust the ignition timing, valve lash, carburetor, and the governor.

Another interest-elevating technique is to supply units which match those on the live engines so that a student can replace the unit with the one he just repaired to test its operation. In this way, laboratory-type projects are elevated in importance in the eyes of the students, and by substituting rebuilt units, the engines are laid up for a minimum time while the units are being exchanged. ★

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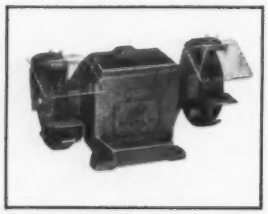

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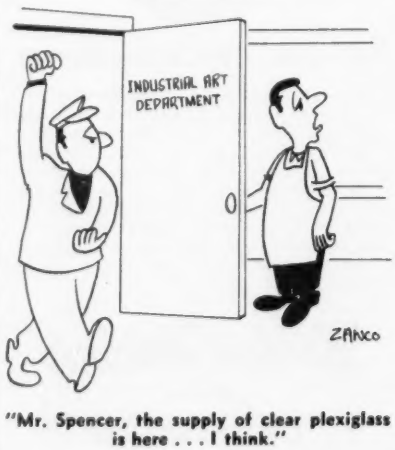

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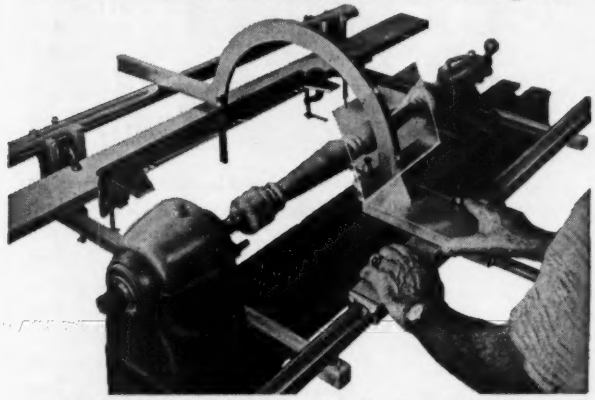

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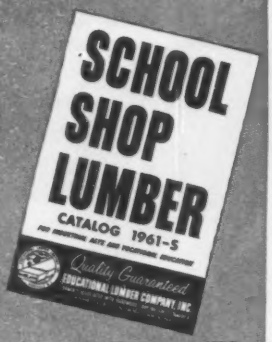

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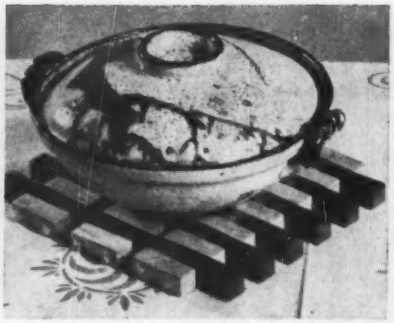


A project for teaching use of drilling jigs.

A production project

Hot-Dish Holder

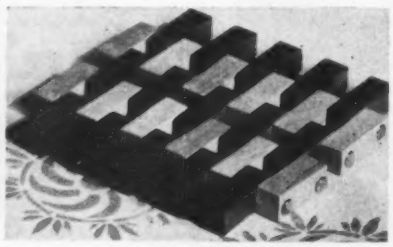
By Athol R. Baily

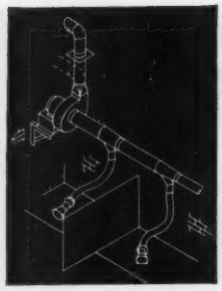
Associate Professor of Industrial Arts, University of Washington, Seattle

THIS hot dish holder is a project that offers multiple advantages to the shop teacher. It can be used for demonstrating the use of jigs and tools in industrial production; it involves working with both wood and metal; it is simple enough for students at lower grade levels and yet, if presented as a problem in design, will challenge more advanced students; and it utilizes small pieces of wood which are usually around a shop.

The holder pictured here is made of maple and walnut wood segments held together with brass rods. To demonstrate a production process, a jig was prepared and set up on the drill press. Holes were then drilled in all the wood pieces. For ease of assembly, all except the end pieces were drilled slightly larger than the brass rods. The holes in the end blocks were drilled to the size of the brass rod to provide a tight fit at those points.

We sanded and applied finish to each piece before final assembly. Speedy rivets were used as fasteners over the ends of the rods to lend a finished appearance. ★





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Safety . . . . . *from page 21*

with the instructor to insure that all students participate in the safety program.

We have set up a safety station in the shop to provide a headquarters for the safety foreman. Here we store safety equipment and materials including the first aid kit, fire extinguisher, accident report forms, pamphlets, and other printed matter related to shop safety. All students are encouraged to use the materials at the safety station.

To stimulate the students to think and express themselves about safety, we encourage them to make posters and write safety slogans. Stress is on originality, and the best work is displayed about the shop. We also have a suggestion box, and students submit written suggestions that are later used as topics for discussions. Several good ideas have come out of the suggestion box and have become practice in our shop.

We maintain an extensive safety-inspection and record-keeping program with the students participating. Students have opportunities during the term to make weekly or biweekly inspections and are required to file written reports. Under leadership of the safety foreman, a daily safety record chart is kept up to date. The chart illustrates pertinent information and provides a comparison between classes. It is prominently displayed.

At the end of the week, the safety foreman writes a report summarizing all information relating to safety for that week. The report is written in the safety book which is kept at the safety station for all students to read. The safety foreman also makes a brief oral report to the class.

To give our safety program a boost, we include features that will have an emotional impact on the student. Each student has an opportunity to examine a glass eye; posters and slogans attempt to impress the precious value of eye sight. Other visual aids include showing slides and filmstrips that are planned for viewing at a time when they will be associated with the work the students are doing in the shop. We also have a display case in the corridor. At least four times a year, the students will prepare a safety display.

We also employ the principle of color dynamics as a visual aid. Safety lanes are clearly marked, and machines and equipment are painted in colors that assist in teaching safety consciousness.

Because a clean, orderly shop is a big step toward a safe shop, we emphasize our housekeeping chores from a safety viewpoint. Housekeeping receives particular attention and is an important part of the weekly student inspection.

It may seem that we are safety conscious to an extreme. But, remembering that we are working with inexperienced youngsters, we find that we need to be constantly alert for ways to stimulate ourselves as well as the students.

We find that inviting qualified safety personnel from industry to share their experiences and thoughts with us is a good way to stimulate both the students and instructors. Safety officers from local plants cooperate willingly and are a continuing feature of our safety program. One safety engineer has been very loyal, frequently visiting our shop to speak on safety.

Our safety program extends far beyond the four walls of the shop. We believe that shop teachers must strive to integrate safe habits and practices into their instruction if we are to educate properly our future engineers, technicians, supervisors, and citizens, who will use tools if only on a hobby basis. ★

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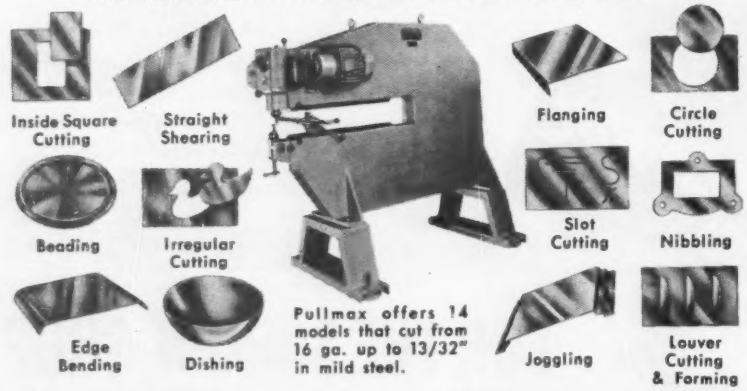

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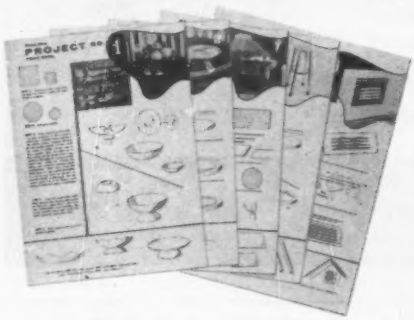

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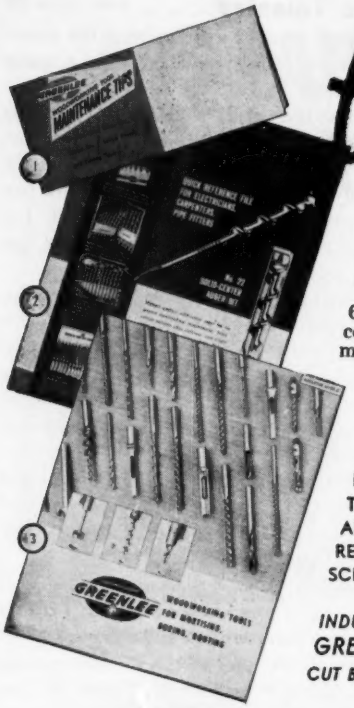

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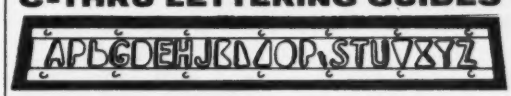

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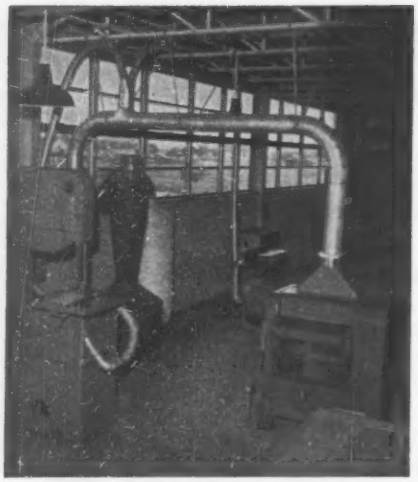

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The Talented . . . *from page* 30

oriented courses will find that the availability of this type of shop is a great advantage.

I use the word "availability" because an industrial-arts course of the type that this report is concerned with would rarely require more than two hours per day, thus leaving the shop available for other courses during the balance of the day.

During the first year, most of the laboratory activities of the course were taught in a well-equipped metal shop. Standard woodworking tools were kept in separate kits. However, the need for wood and plastics power equipment was apparent.

One tensile tester, one guided bend tester, and an inspectoscope comprised the material-testing equipment of the shop laboratory.

In your opinion, what type of professional preparation would be most desirable of anyone to teach this course?—Since the content of the course extends considerably beyond the limits of conventional industrial-arts courses, it is necessary for the instructor to supplement his knowledge by additional reading and by taking courses in such areas as metallurgy, engineering materials, manufacturing practices, etc. A wide range of actual industrial experiences would be invaluable. In view of present educational and credential requirements for industrial-arts instructors, however, this recommendation does not appear to be practical.

Many law, dental, medical, and engineering schools have "on the job" cooperative training programs in conjunction with the last two years of university work. At the University of Cincinnati, for example, instruction is on a year-round basis, and the students spend 50 percent of their last two years in training outside of the school.

Schools have a great opportunity and responsibility to offer an industrial-arts course providing fundamental engineering and scientific insight and stimulation for able students in their high schools.

College-prep students at Fullerton Union High School have responded favorably to this new course that is designed specifically for their abilities and needs; a course that provides fast-moving, meaningful activity, and a challenge. The practical experience provided by this course, coupled with the theoretical principles involved, lead student insight to a fine orientation and motivation for further technical, engineering, or scientific study. ★

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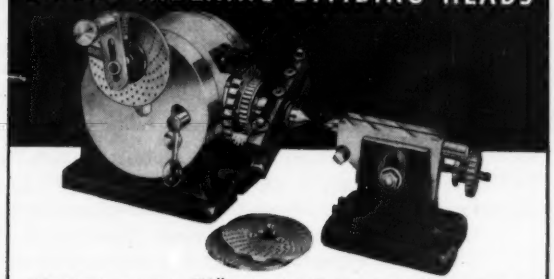

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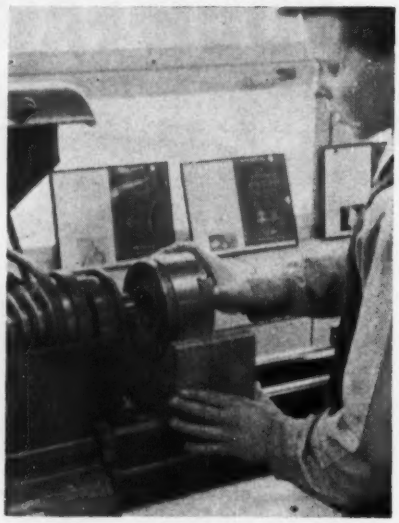

The use of a fitted wooden support guide when changing chucks or face plates will greatly reduce the chance of damage to the ways and spindle threads of your lathe. As demonstrated in the picture, the student sets the chuck on the block, slides the block up to the spindle, and rotates the shaft until the chuck is tight. There are no heavy lifts, pinched fingers, or dropped chucks.

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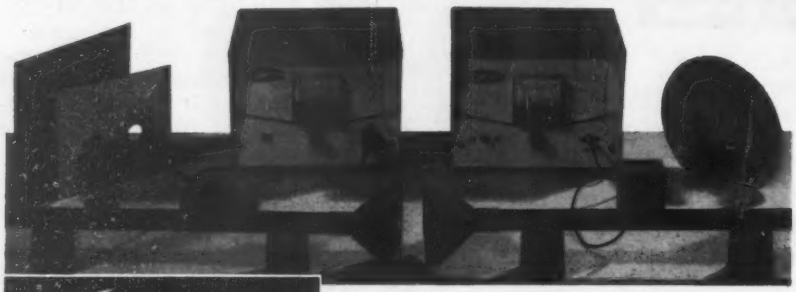

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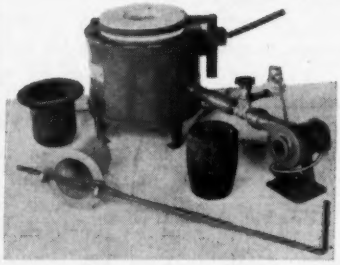

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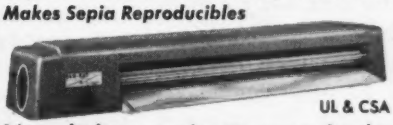

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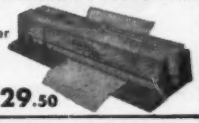

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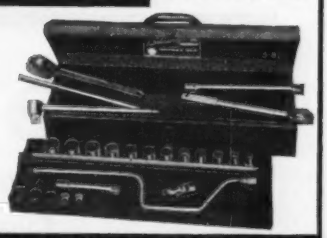

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I have found that filmstrips become more meaningful when the captions are read aloud. By having each student recite a frame, there is more likelihood that students will remain alert.

If the filmstrip includes a quiz, I have one boy read a question and his classmate next to him answer it; and so on. — *Lawrence Zane, Honolulu, Hawaii, Technical School.* ★

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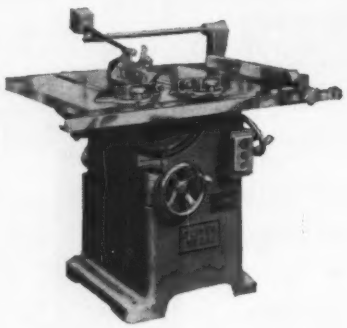

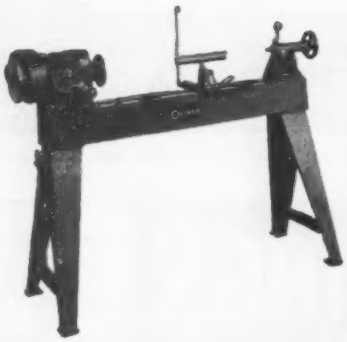

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Metalforming . . . *from page 28*

The equipment was prepared from common scrap materials. The prime requisite governing selection was that a safety factor of unquestionable strength had to be maintained.

After much research concerning pressures exerted by contained explosive charges, to satisfy my concern for safety, a "Bull Nose" (a device used for capping large steel pipe), was selected to serve as container for the charge. Care and precision are imperative in constructing the firing unit as it must be air and pressure tight throughout, and a safety valve must be provided. The leather gasket between the aluminum lid and the flange of the container acts as a seal and also as a safety valve for pressure *above* the work piece. The small relief hole at the bottom of the container acts as a safety valve *below* the work. This hole should be $\frac{1}{8}$" or larger.

I began testing the unit with a blank 22 cartridge as a charge, using 22-gage aluminum for a work piece. The charge did not produce sufficient force to shape the metal. Following an unsuccessful test with a blank 32, I achieved a perfectly formed shape with a blank 38 cartridge.

The unit is fired by hand by tapping the firing pin with a mallet. It would be simple to devise a lever firing system that would permit the operator to stand some distance from the unit. Safety goggles should be worn, of course, and instruction on proper handling of blank cartridges cannot be overemphasized.

Perhaps the best safety precautions are present in the educational benefits. There is ample information about pressures generated by cartridges, and other explosives, and the strength of materials available from manufacturers, and reference books. Professional gunsmiths are another excellent source of technical information regarding pressures and strengths of materials under explosive pressure.

If properly researched, properly constructed, and properly supervised during operation and handling of materials, the danger element is no greater than with many other familiar shop operations. I rate it high for what it can teach about math and science. And we cannot ignore that in a few years some of our students may be earning their living by operating equipment employing this principle. ★

Objectives . . . . . *from page* 16

comes a matter of values, of first things first, and of balancing needs and desires against means. Knowledge of products and services is, of course, essential to this end.

Like home economics, social studies, business education, and science, industrial arts attempts to impart consumer knowledge. Theoretically, at any rate, industrial-arts teachers have the advantage here. They work in a situation in which the learner, once he is beyond the basic skills, can propose a project, plan it in detail, construct it with his own hands, and then evaluate it. It would seem that teaching about consumer problems in a social-studies class, for example, could hardly be this concrete. But it does not follow that a boy will acquire keener insight into consumer values by simply making something in the shop. Consumer knowledge must be made a conscious objective in the teaching process.

The intrinsic value of any industrial product rests, in the main, in three things: its design, the materials of which it is made, and the workmanship put into it. The value of an antique object may be largely extrinsic. If experience in an industrial-arts shop is to result in an increased understanding and appreciation of these factors, they must, as Kilpatrick says, be made objective of thought in the teaching process. I am afraid that this is not generally done, for research reveals that boys who have had industrial arts in high school score no higher on tests designed to measure consumer knowledge and appreciation than do boys of comparable ability who have not had such instruction. Here is an area of industrial-arts teaching that needs much more study and research.

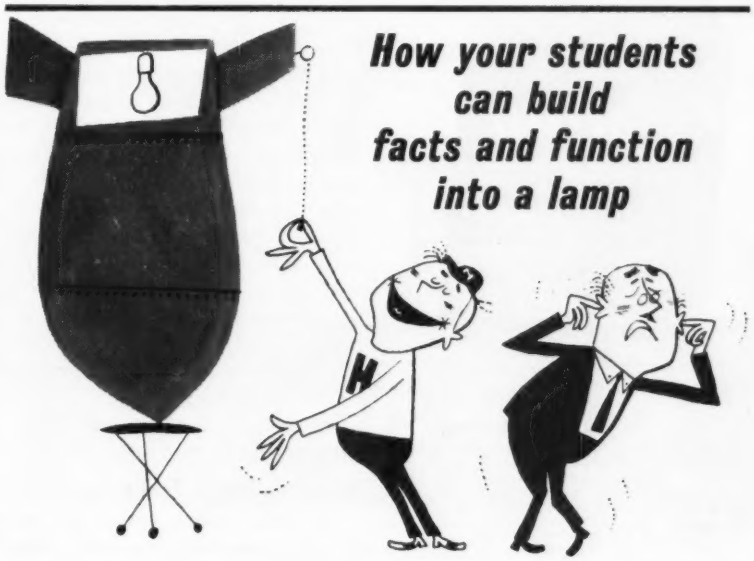
Safety Habits and Attitudes

Although I know of no studies which have measured how successful we have been in industrial arts in developing safety habits and attitudes, I do think it is clear that we have definite responsibilities here and a favorable situation in which to develop such habits and attitudes. But, let us remember that other teachers of athletics, driver education, and home economics work hard at this also. Certainly, if we are to achieve this end, we must teach deliberately for this purpose. We cannot assume that safety habits and attitudes will come as concomitant outcomes of lectures, demonstrations, excursion trips, and the like. We must see to it that pupils place the correct interpretation on safety precautions, rules, and regulations, for out of such interpretations safety attitudes are born.

As valuable as it may be to give lectures and courses on safety in school shops, this alone is not enough. Safety must be taught as an element in the correct performance of everything we do in the shop. To attempt to teach a course in safety, detached from shop operations, and then forget about it, is about like eating all the salt one needs for an entire year at one time, and then dismissing the matter!

Leisure-Time Interests and Abilities

Today, in America, with automation and increased mechanization, productivity is skyrocketing to new heights. The result is an economy of abundance with a higher standard of living and more leisure time. If "idle hands are the devil's workshop," then it is clear that people with increasing amounts of leisure time must be educated to use their leisure in a manner that will be



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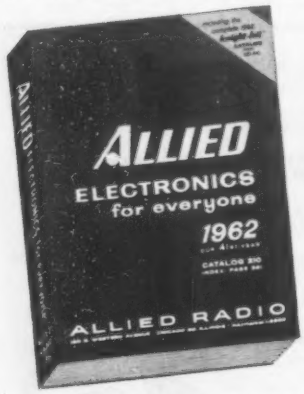

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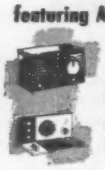

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personally satisfying and socially desirable.

Successful experience in industrial arts in high school should result, we believe, in enduring interests in working with tools, machines and materials in and around the home. There is evidence that this objective of industrial arts is being attained to a considerable degree. Witness, for example, the thousands of home workshops set up by boys and their fathers who have had such instruction, and the extensive do-it-yourself activities carried on by former industrial-arts students.

We must remember, however, that music, home economics, athletics, nature study, and perhaps other phases of the school program, are likewise contributing to the worthy use of leisure time. In some places, due to poor teaching or poor facilities, or both, we may find students who want nothing more to do with tools, machines, and industrial materials once they are done with their industrial-arts courses in high school. If we in industrial arts are to make the most of our opportunity and responsibility in this respect, our own craftsmanship must be a model of excellence, and we must be creative, enthusiastic, resourceful, and stimulating to our students. How do you and I as industrial-arts teachers square up in these respects?

Personal-Social Traits

At birth, human beings are neither honest, cooperative, courteous, dependable, unselfish, nor considerate of others. They have an almost endless urge to eat and two strong fears—fear of loud noises and lack of support. We all like to think that we were attractive at birth, at least to our mothers, but the fact is, regardless of how we may appear now, none of us were too handsome at that time! Our heredity was fixed, of course, but from then on, it was a matter of environment.

In the industrial-arts shop, we have an active learning situation rather than a passive one. Even so, if we are to develop desirable personal-social traits on the part of our students, and these are most important, we must have these traits clearly in mind and we must make them objects of thought or conscious objectives in the teaching process and in our personal relations with pupils, from the first bell to the last, the year around. And here again, precept and example on the part of a respected, dedicated, considerate teacher are first essentials. Pupils must be led to place

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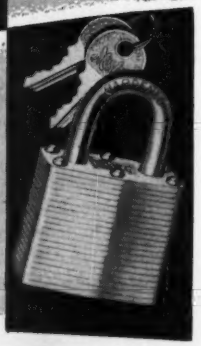

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the proper interpretations on their experiences and to realize the importance of desirable personality traits.

Conclusion

In conclusion, I want to call attention to two important subject-matter areas which, in my judgment, are being grossly neglected in the training of industrial-arts teachers. I refer to science and economics. Industrial arts is basically economic education because modern industry is no more than applied science and art, planned, manned, and controlled for the production and distribution of economic commodities. I am astonished by the large number of industrial-arts teachers who come to our graduate school with not one whit of training in either of these subject matter areas.

As I get around the country, I meet some people who seem to think that industrial arts, and the other practical subjects, are on the way out of our schools. Nonsense! In the main, the recent criticism we have had of education should result in improvements. For one thing, we are already classifying and guiding students into education programs more nearly on the basis of their ability and the needs of society than ever before. As this is done, we will have more people, not less, taking practical arts and vocational subjects. At the same time, however, we are likely to find these subjects being taken, on the senior-high-school level, chiefly by students whose abilities and interests place them largely outside of the profession-bound groups. Wise industrial-arts teachers, I am convinced, will accept this and make the most of it, realizing that there are more Indians than there are chiefs!

This does not mean, of course, that industrial arts has little to offer the brighter student on the senior-high-school level. It simply means that he will be guided, in the main, in a different direction. But, the industrial-arts teacher will have a correspondingly larger responsibility in the education of the masses. Salaries are improving, better schools are being built, and the outlook in our profession is good. Chins up! ★

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If you have changed schools this fall, please send your old as well as new school address to the Circulation Department, SCHOOL SHOP, 416 Longshore Drive, Ann Arbor, Mich., so that you will continue to receive your copies of the magazine.

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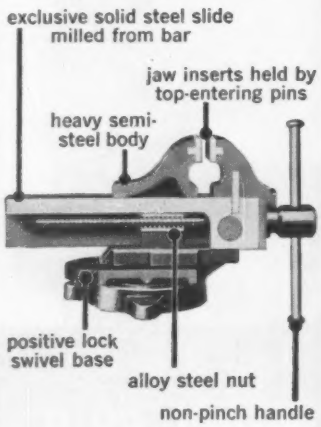
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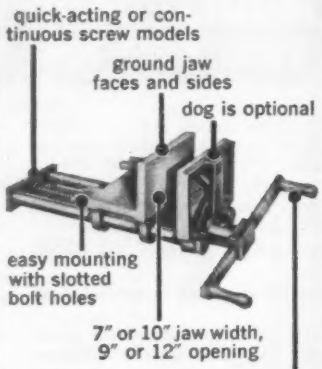
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Verne C. Fryklund, president, Stout State College, Menomonie, Wis., retired Sept. 1, 1961 after 16 years in office. Dr. Fryklund's association with the college began prior to World War I, when he was an undergraduate. His long and active career in education is distinguished with contributions to education through service with many professional organizations. That service has brought him many awards including the Legion of Merit for his services to education in the armed forces during World War II. In 1953 Dr. Fryklund received the "Outstanding Achievement Award" from the University of Minnesota, and this year was named "Man of the Year" in industrial education at the national convention of the American Industrial Arts Association held in April in St. Louis. During the years of his presidency at Stout, Dr. Fryklund led an administration program that brought vigorous growth and expansion in curriculum, enrolment, and plant facilities.

Dr. V. C. Fryklund

William J. Micheels, president of the American Industrial Arts Association, and formerly chairman of the department of industrial education at the University of Minnesota, has been named the new president of Stout State College.

Ferdinand Rossy, director of industrial-arts education in Puerto Rico, will retire September 15. Mr. Rossy's service to industrial-arts education in Puerto Rico, as a teacher, supervisor, and director, spans 48 years.

John A. Roeder recently was named as professor of industrial education, Bureau of Vocational Curriculum Development and Industrial Teacher Training, the University of the State of New York. He will serve in the Bureau's regional center at Buffalo. He taught formerly at the Erie County Institute of Applied Arts and Sciences.

William L. Cooper, Pennsylvania state supervisor, trade and industrial education, died April 16.

Harry Lewis has been appointed director of trade and industrial education for the New York City schools, following 10 years as coordinator of vocational curriculum with the bureau of curriculum research.

C. R. Dixon, director of industrial education in Ithaca, N. Y., retired in June, 1961, concluding 38 years of service in that city.

Ernest J. Coverdill, chairman of the industrial-arts department, Southeastern High School, Detroit, has been named supervisor of industrial education for Detroit Public Schools.

Charles B. Porter, formerly assistant professor of industrial arts, University of Illinois, is now chairman of the industrial-arts department at Illinois State Normal University, Normal.

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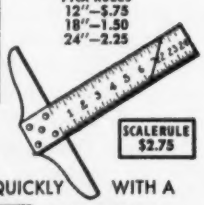

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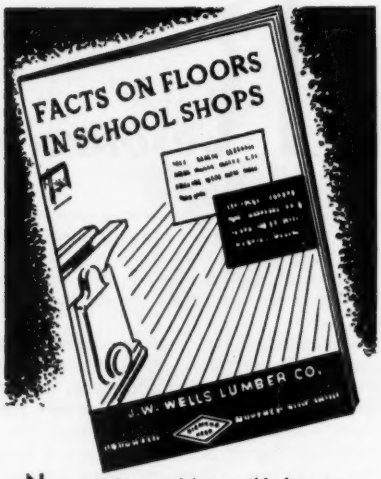

New, reliable, useful now, this is a summary of reports from superintendents of 57 major school districts on the kinds of floors they now have — floors they prefer, — for each of 8 major shop areas, woodworking, metalworking, printing, etc. (Survey made by Industrial Arts & Vocational Education Magazine, 1959.)

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Oswald A. Ludwig, member of the faculty at Henry Ford High School, Detroit, Mich., died March 1, 1961, at the age of 64. Mr. Ludwig was the author of several shop textbooks.

Arthur J. Elges, formerly department chairman at Cass Technical High School, has been promoted to supervisor of trade and technical education, Detroit, Mich.

Lorenz Hielsberg, chairman of the industrial-arts department, Oshkosh, Wis., High School, retired in June, 1961, after 43 years service in this school. **Sydney C. Scoville** will be the new chairman of the department.

F. Sheldon Davis, chief of the division of vocational education, Rhode Island State Department of Education, died April 3, 1961. Mr. Davis served as a department staff member for 18 years.

George L. Sandvig has been appointed Virginia state director of the division of vocational education. He succeeds **Richard Edward Bass**, who died last spring.

Samuel Kerr has accepted an appointment as associate professor of industrial education at Virginia Polytechnic Institute, Blacksburg. Kerr formerly served as assistant state supervisor of trade and industrial education in Virginia. Kerr succeeds **J. S. Carpenter** who resigned to accept a post as state supervisor of trade and industrial education in Delaware.

George E. Wallace is Virginia's new state supervisor of trade and industrial education. He was formerly assistant supervisor. Wallace joined the State Department of Education in 1951 following a teaching career that began in 1937.

Lawrence L. Hurr, Marcus Maynard, Clarence G. Monson and **John J. Pesek** have all retired after many years of teaching at Dunwoody Industrial Institute, Minneapolis, Minn.

Edward L. Katzenbach, Jr., Trenton, N. J., has been named deputy assistant secretary of defense in the office of the assistant secretary of defense. This is a new position with responsibility for the policy direction and coordination of Armed Forces education and information programs, relationships between the Department of Defense and civilian educators, and for the manpower resources involving technical and other critical skills. He formerly held administrative posts at Princeton, Columbia, Harvard, and Brandeis Universities. ★

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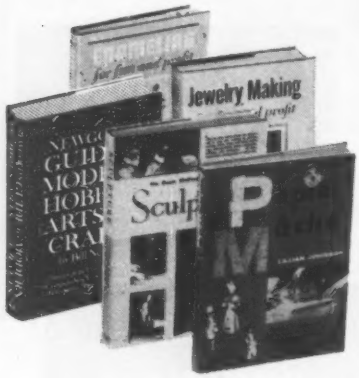

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Books:

Glenn's New Auto Repair Manual. Glenn. Philadelphia: Chilton Co., 1961. Pp. xxx + 1076. $7.95.

This manual covers the essential repair processes of auto servicing in detailed, illustrated, step-by-step instructions.

Harold T. Glenn is an automechanics teacher with long experience and he presents the material in a manner that reflects that teaching experience. The student and the mechanic working alone will find the instructions easy to follow.

The book is arranged by topics. There is an opening chapter on troubleshooting and following chapters trace the flow of power from the engine through the drive train to the rear wheels. Drawings and photographs are used extensively.

There is a section dealing with electrical systems of American cars and a special section on carburetors and fuel-injection systems. Other features of the book include a foreign-car department with detailed information on the 35 largest manufacturers. The Volkswagen is dealt with independently, receiving the full treatment, including exploded views and wiring diagrams.

A sizable portion of the book is devoted to servicing the modern power devices: steering, brakes, tops, seats, and windows.

Woodworking for Everybody. (Third Edition.) Shea. Princeton, N. J.: D. Van Nostrand Co., Inc., 1961 Pp. xi + 219. $6.25.

The author, John G. Shea, is a designer, magazine editor, and a woodworking hobbyist. In this revised third edition, all practical aspects of wood and woodworking are covered. A section, "The Story of Wood," explores modern forestry practice, manufacture of lumber, plywood, and other wood construction materials.

The chapters on modern hand tools and power tools include many tools, techniques, and processes that have developed since the first edition.

The final section presents detailed working drawings, illustrations, and instructions to guide the reader in constructing a wide variety of projects. There is also a comprehensive reference listing to a source of available project plans.

Excellent and numerous illustrations accompany each section.

Engineering-Technical Drafting and Graphics. Giachino and Beukema. Chicago: American Technical Society, 1961. Pp. 778. $9.75.

This volume is an overview of the significant fields of drafting emphasizing techniques currently practiced in the various areas of industry. The opening chapters are concerned with presenting basic drafting information. Succeeding chapters focus on the drafting practices of particular fields such as structural, map drawing, graphs and charts, plumbing, heating, etc.

The authors, J. W. Giachino, chairman, department of engineering and technology, and H. J. Beukema, supervisor of drafting, Western Michigan University, note in the preface that there is often a lag between drafting procedures being taught in schools and actual practice in the field. The authors have attempted to overcome that lag by enlisting cooperation of industrial firms and incorporating the essential elements of current drafting practice into this volume.

Problems presented at the end of each section are based on actual products and are presented to require some design effort on the part of the student.

The Arco Workshop Companion. W. Oakley. New York: Arco Publishing Co., 1961. Pp. 217. $2.50.

The author has written this book as a "Guide to Making Things." It is aimed at the teen-age boy, presenting information on tools and materials at the beginning level.

Tools, materials, equipment, and the shop for working with wood and metal are discussed in an easy-to-read style, and many excellent illustrations emphasize the proper use and care of tools and equipment.

A basic list of tools, an expanded list, and a fairly complete list for a workshop are discussed as to their particular use, the various models available, and the average prices.

There are sections on the properties of the most commonly used metals and woods and information on some of the particular problems encountered when combining the two materials in a project.

Experiments with Materials and Products of Industry. Earl Bloomington, Ill.: McKnight & McKnight, 1961. Pp. xiii + 351. $6.00.

Here is a text for teaching industrial arts through research and experimentation with materials and products of industry.

The text presents illustrated descriptions of procedures for constructing apparatus and conducting experiments with materials used commonly in industrial-arts instruction. There are projects for testing the holding power of material fasteners, for measuring the durability of finishes, and many others concerned with electricity, photography, plastics, and textiles.

Each experiment is introduced with a short informative description of the material and its function. The specific problem is then presented (such as determining from several types of insulation material the one best suited for door-bell circuits), needed materials and

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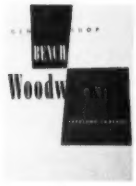

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By J. H. Douglass 011

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equipment are listed, a procedure for conducting the experiment is suggested, samples of record-keeping forms are illustrated, and a selected reference reading list accompanies each unit.

The author, Arthur W. Earl, is a professor of industrial-arts education at Montclair State College, New Jersey. Earl credits Donald Maley, chairman, industrial education department, University of Maryland, with developing this concept of teaching industrial arts. The author also notes that many of the experiments have been developed and tested in teacher-training classes at Montclair.

Fundamentals of Carpentry. Vol. I. (Third Edition.) Durbahn. Chicago: American Technical Society, 1961. Pp. 383. $4.75.

This book is organized primarily for class or shop instruction. It presents basic information concerning the fundamentals of carpentry in concise and simple terms.

As a learning aid, each chapter begins with a set of questions that will be answered in the text of that chapter and ends with a set of test questions to check the student's learning.

This third edition has been revised and expanded to maintain the text in keeping with advances that have been made in the field. Chapters on "Modern Carpentry Tools," "Power Tools," "Insulation," "Blueprint Reading," etc. indicate the purpose of the book: to increase the student's knowledge and to develop practical skill.

Construction and Maintenance for Farm and Home. Foss. New York: John Wiley & Sons, Inc., 1960. Pp. ix + 373. $6.95.

The material in this book is confined mainly to a discussion of tools and their use on various types of work. Among the areas of work included are woodworking, including carpentry, concrete and masonry construction, sheetmetal work, forging and heat treating, oxyacetylene and arc welding, and power transmission.

A few projects are included to illustrate methods of using tools, and of laying out and assembling projects with many parts.

Edward W. Foss is professor of agricultural engineering, Cornell University, Ithaca, New York.

Statistics and Strength of Materials. Bassin and Brodsky. New York: McGraw-Hill Book Co., Inc., 1960. Pp. viii + 354. $7.00.

This book is based on an earlier text titled *Practical Mechanics and Strength of Materials*. This new edition retains the practical approach of its predecessor, but it introduces modern practice to increase its value as a teaching aid.

It is designed specifically for use by students in community colleges, junior colleges, and university extension coures in technician-training programs. It is suitable for students who are not familiar with the subject of calculus.

Milton G. Bassin and Stanley M. Brodsky are associate professors of mechanical technology, New York Community College.

(*Turn to page 64*)

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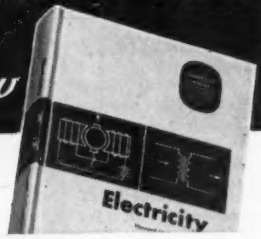

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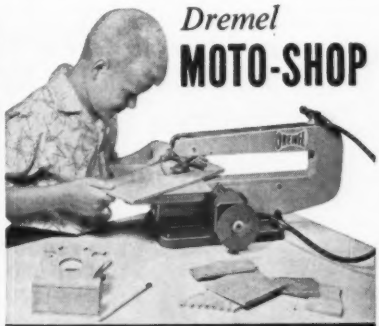

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Determining Requirements for Development of Technical Abilities Through Extension Courses is a 14-page pamphlet presenting suggestions and methods for augmenting established extension training programs for updating and upgrading technical workers for increased effectiveness. Prepared by the Division of Vocational Education of the U.S. Office of Education, the pamphlet is available at $.15 per copy from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C.

Recommended Practices for Automotive Welding Design is a 48-page illustrated booklet compiled by experts on the subject from the major auto manufacturers and related industries. Subjects include resistance, arc, oxy-acetylene and braze welding, and torch brazing. A chart of American Welding Society Standard Welding Symbols is included. The manual is slanted to the needs of welding engineers in the automotive industry but contains design information meaningful to many fields.

Copies are $2.50 from the American Welding Society, Technical Dept., 3 West 39th St., New York 18, N.Y.

Deadly Reckoning—The Travelers 1961 Book of Street and Highway Data is a 29-page booklet filled with statistics and ironic cartoons concerned with traffic injuries and deaths during 1960. This is an annual publication by The Travelers Insurance Companies. Requests concerning the booklet should be addressed to J. G. O'Brien, The Travelers Insurance Companies, Hartford, Conn.

Printing Education in the United States is a nine-page booklet containing information about the printing industry and outlining education programs to prepare students for careers in graphic-arts. The booklet is published by the International Graphic Arts Education Association, 5728 Connecticut Ave., N.W., Washington 15, D.C.

Facts You Should Know is an eight-page booklet subtitled "Relation of Vocational and Practical Arts Education to Economic Well-Being." The booklet shows the relationships of the practical arts and the economics of national production. Published by the American Vocational Association, Inc., copies are priced at $6.00 per hundred or $.10 per copy in orders less than 100. Order from the Association, 1010 Vermont Ave., N.W., Washington 5, D. C.

Factory Jobs is a 26-page booklet describing the work and employment outlook for workers in unskilled classifications. The booklet was prepared by the U.S. Department of Labor's Bureau of Labor Statistics in cooperation with the Veterans Administration. This bulletin, No. 1288, is available for $.25 from the Superintendent of Documents, Washington 25, D.C.

Instructional Materials Publications is a 40-page booklet listing and describing instructional materials for industrial arts and vocational subjects. The materials were developed by the Instructional Materials Laboratory, Ohio State University. Prices are nominal. To receive the descriptive booklet, write to the Laboratory, 1885 Neil Ave., Room 112, Columbus 10, Ohio.

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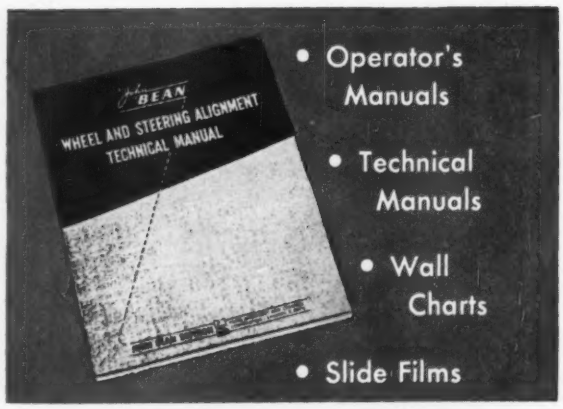

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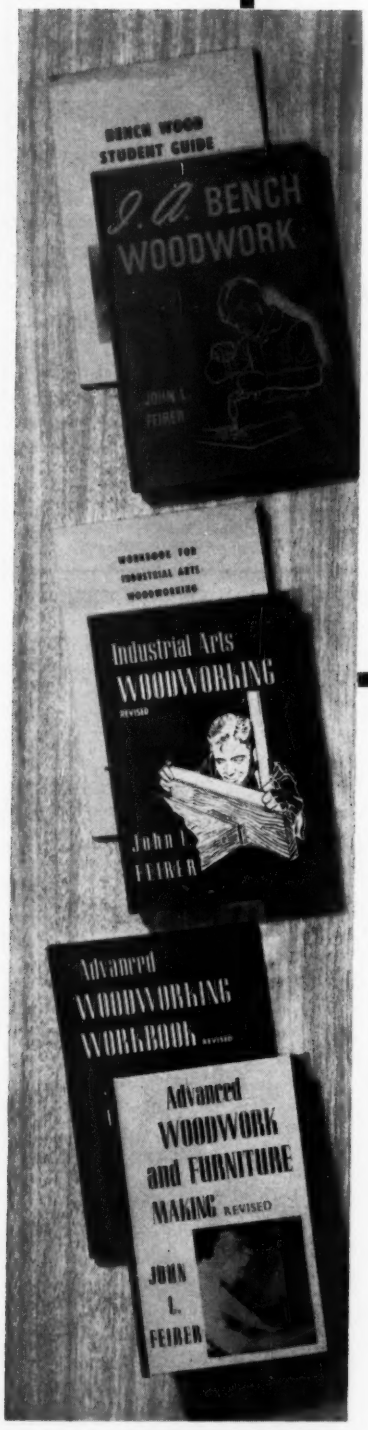

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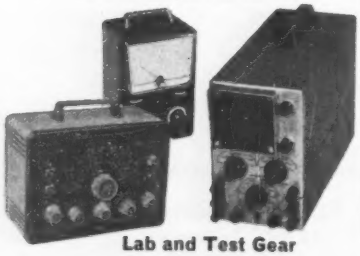

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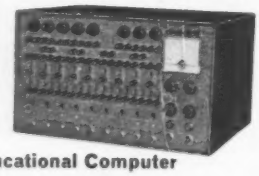

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Let's Find Out Through a Trade and Industrial Education Community Survey is an 18-page booklet outlining procedures for determining community need and student interest in trade and industrial education. The booklet is available from Ohio State University, College of Education, Columbus 10, Ohio.

Arranging the Classroom for TV Viewing is a brochure describing techniques for efficient arrangement of a TV classroom. Recommendations are made concerning set height, viewing distances, use of window shades, and direct and indirect lighting. Several possible arrangements are illustrated in diagramatic form.

Copies of the brochure may be obtained free from Commercial Engineering Dept., Sylvania, Lighting Products Div., 60 Boston St., Salem, Mass.

KT-174 Assembly Manual is a 55-page booklet containing detailed, illustrated instructions for assembly of the Lafayette KT-174 vacuum tube voltmeter. A complete list of materials is included. Price is $.50 from the LaFayette Electronics Manufacturing Corp., 165-08 Liberty Ave., Jamaica 33, N.Y.

Audio Visuals:

Lens Shade Selector Chart is a wall chart published by the American Welding Society that gives a quick correct selection of proper lens shade for eye protection during various welding operations. Shade numbers are arranged in increasing light intensity order, from soldering to carbon-arc welding. Copies of the eye protection chart are available at $.50 each or 10 for $4.50 from the American Welding Society, Technical Dept., 33 West 39th St., New York 18, N.Y.

Look-Listen-Learn is a catalog of films available from the Audio-Visual Extension Service, University of Minnesota. In addition to a descriptive listing of films in many subject areas, including specific machine operations such as boring to close tolerances, the catalog presents helpful information on the care and handling of films. To receive the catalog contact the Audio-Visual Extension Service, University of Minnesota, Minneapolis.

Amperex Computa-Guide is a device for aiding in the calculation of performance of RF amplifiers, doublers, and triplers. It is designed to facilitate the numerical method of Fourier Analysis in computing the performance of RF amplifiers of classes B and C, and frequency multipliers. For detailed information on the Computa-Guide write to Amperex Electronic Corp., 230 Duffy Ave., Hicksville, L.I., New York.

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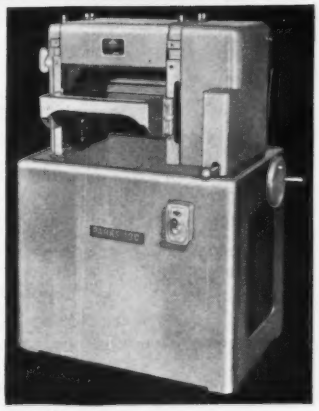

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News ABOUT TRAINING The Technician

Curriculum Project Reported by Michigan State University

Explorations in Research Design: Curricula for Technicians is the final report of a project to discover what content ought to be included in senior-high school and junior-community colleges. The paper outlines the considerations, procedures, and interdisciplinary approach which "sophisticated research should use to develop a matrix model for identifying the amount of kind of 'skill' peculiar to technicians."

The report has been issued by the Office of Research and Publications, College of Education, Michigan State University, East Lansing.

Also, Train the Wives

A PLAN that would include the training of wives of technicians before the couple is sent to Africa on International Cooperative Administration missions was proposed by Dr. John D. Montgomery, a staff member of the Boston University African Studies Program.

Following a tour of 10 African nations, Dr. Montgomery said, "Nearly all ICA directors I spoke to agreed that a principal cause of American technician failure was the indifference of the wives and families."

The program, established at Boston University in 1959, functions to train ICA technicians who will be assigned to Africa. Dr. Montgomery stated a belief that if wives were given orientation training, an improvement in morale would result and the purpose of the program would be advanced.

New Programs

INSTRUMENTATION and automation is a new technical course scheduled to be offered this September at Central High School District No. 3, Merrick, N. Y. It is felt that the course not only will offer increased job opportunities to those students not planning to go to college, but it will serve as college preparatory work because it will include math and science required for college entrance.

The program will place equal emphasis on the theoretical aspects of mathematics, physics, electronics, and chemistry, as well as their practical application to instrumentation and automation through extensive laboratory work.

Roanoke, Va., Technical Institute is opening this month with three technical curriculums: electrical, mechanical, and industrial technology. James McVean, formerly dean of the faculty at Broome Technical Community College, Binghamton, N. Y., is director of the new institute, which is an extension of Virginia Polytechnic Institute. A new campus is under construction, with two buildings scheduled to be ready for the school's opening to accommodate the anticipated initial enrolment of 100 students. Mr. McVean is succeeded at Broome Tech by Frank Chambers, formerly director of admissions there.

Names in the News

CHARLES W. MOREY, founder and president of Chicago Technical College, is dead. He and his associates founded the college in 1904. A home-study program at the college was established in 1911. Dr. Morey took an active interest in the formation of the National Home Study Council in 1926. In 1936 Purdue University honored him with a doctorate degree.

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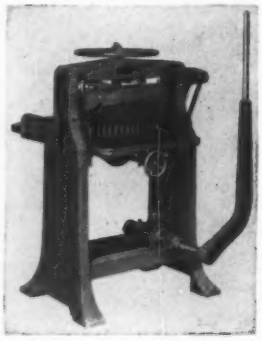
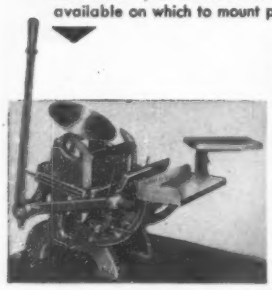
Chandler & Price Pilot Press—Many thousands of these small presses are in use in schools and other institutions. The basic fundamentals of printing can be taught with this press which does an exceptionally fine job of printing. Chase size 6½″ x 10″. Can be equipped with an ink fountain, if desired. Steel cabinet stand is also available on which to mount press.





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NORMAN C. HARRIS has been appointed associate professor of technical education at The University of Michigan, Ann Arbor. Mr. Harris had been dean of technical-vocational education at Bakersfield, Calif., College since 1953.

In his new post, Mr. Harris will work with the department of higher education and the department of vocational education and practical arts in the school of education.

CHARLES W. LAFFIN, JR., is the new president of the Long Island Agricultural and Technical Institute at Farmingdale, N. Y. He succeeds WILLIAM A. MEDESY, who resigned to become president of Rangely, Colo., College.

Dr. Laffin had been vice-president and dean of Nassau Community College, Mineola, N. Y.

RAY L. WHEELER, president of the State University Agricultural and Technical Institute at Cobleskill, N. Y., is dead. Dr. Wheeler was president of the school from 1947 until his retirement on March 6, eight days before he died.

He started his career at the school in 1923 as instructor of dairy technology. CHARLES M. GAFFNEY, dean of the school, has been appointed temporary president.

On Tour

SIX American technical-education leaders flew to the Soviet Union last May to survey technical education in that country. They are: Walter M. Hartung, dean of New York State Academy of Aeronautics; Edmund J. Gleazer, Jr., executive director of the American Association of Junior Colleges; Joseph P. Kozlowski, professional assistant at the National Science Foundation; A. Ray Sims, dean of the College of Technology at the University of Houston in Texas; P. Parker Wilber, president of Los Angeles Trade-Technical College, Calif., and Karl O. Werwath, president of the Milwaukee School of Engineering.

Their tour lasted 24 days. One of the immediate and strongest impressions gained was the extensive use of modern equipment and good teaching aids.

The group planned to visit at least 30 to 40 *technicums*, plus factories, correspondence schools, on-the-job training areas, and industries.

The trip, sponsored by the American Association of Junior Colleges and the American Society for Engineering, was financed by the National Science Foundation. ★

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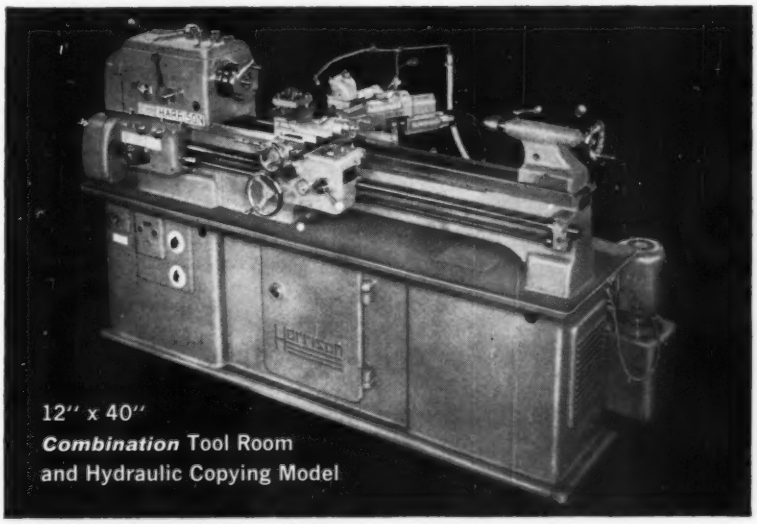

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news from Industry

(Circle the numbers on the card in this issue to secure the items listed.)

New Series of 14" Swing Lathes Announced by Logan Engineering

A new series of 14" swing lathes featuring variable speed drive of 40-1400 rpm and providing instant speed adjustment without belt shifting has been announced by the Logan Engineering Company.

Features of the new lathes include: 14⅝" swing over beds, 9" swing over saddle cross slides, center distances of 28", and two precision ground V-ways and flat ways.

The company also states that high, strong walls braced by oversized ribs provide the lathes with wrap-free beds capable of withstanding the heaviest stresses.

For further information, write to the company, 4901 West Lawrence Ave., Chicago 30, Ill., mentioning SCHOOL SHOP; or *circle no. S-1 on the business-reply card.*

New Quick-Contact Veneer Glue by Albert Constantine and Son, Inc.

Albert Constantine and Son, Inc., are now marketing a new, nonstaining, quick-contact glue for attaching thin veneers to old or new wood, metal, or composition-board surfaces.

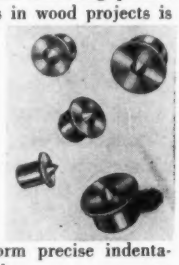
The new glue permits the veneer to be rolled, eliminating the necessity of clamps, and it adheres permanently on contact, the company reports.

An "Experimenter's Kit" containing samples of exotic veneers and one pint of the glue is being offered at an introductory price.

For complete information write to the firm at 2050 Eastchester Rd., New York 61, N.Y., mentioning SCHOOL SHOP; or *circle no. S-2 on the business-reply card.*

KenKraft Markets Low-cost, Dowel-Centering Set

A dowel-centering set for achieving perfect alignment of dowel joints in wood projects is now available from KenKraft.



The dowel centers are inserted in holes drilled in one of two pieces to be joined. The piece is then placed in position against the section it is to be joined with, tapped with a mallet, and the dowel centers form precise indentations for drill locations, the company reports.

There are six centers to a set with pairs for ¼", ⅜", and ½" dowel joints.

For more information write to the company, Box 596, Manhattan Beach, Calif., mentioning SCHOOL SHOP; or *circle no. S-3 on the business-reply card.*

Adjustable Suction Tube for Unit-Type Dust Collectors Developed by Torit

A fully adjustable suction-tube assembly for unit-type dust collectors that, it is claimed, will eliminate the need for permanent ductwork and increases the efficiency of cabinet cloth-filter collectors is now being marketed by the Torit Manufacturing Company.

The suction tube consists of a flexible, fabric hose supported by lightweight arms which pivot to permit any desired positioning. Available in 3" and 4" hose dia., the assembly rotates 360° and has an up and down travel of nearly 8'. The new assembly allows the collector to be moved about to serve a new operation, the company reports.

For additional information write to the company, 1133 Rankin St., St. Paul 16, Minn., mentioning SCHOOL SHOP; or *circle no. S-4 on the business-reply card.*

Cenco Introduces New Low-Voltage Power Supply Unit

A compact, low-voltage, power supply unit for operating small motors, electromagnets, electroplating and electro-analysis experiments, charging batteries, and lighting lamp filaments is available from Central Scientific Co., a division of Cenco Instruments Corporation.

The unit operates on 115-v, 50/60 cycle ac. Large, universal-output terminals accept all common electrical connectors. Maximum current rating of the unit is 3 amps for normal

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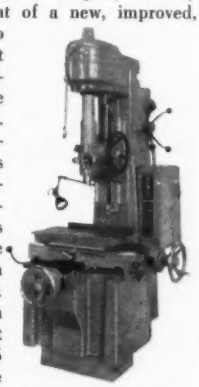
For more information write the company, 1700 Irving Park Rd., Chicago 13, Ill., mentioning SCHOOL SHOP; or *circle no. S-5 on the business-reply card.*

Moore Markets New Jig Borer

The Moore Special Tool Company recently announced development of a new, improved, jig borer designed to be popularly priced yet to retain precision quality usually found in the more expensive models.

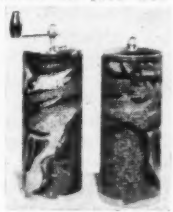


The company describes the machine as being capable of performing work to extremely close tolerances at infinitely variable speeds ranging from 120 to 2400 rpm. A special three-position clutch for more efficient operation is one of 15 improvements that are featured in this new precision machine tool.

For additional information, write the firm at 800 Union Avenue, Bridgeport, Conn., mentioning SCHOOL SHOP; or *circle no. S-6 on the business-reply card.*

Prizes Awarded in George S. Thompson Pepper Mill Design Contest

Dennis Berglund of Ben Lomond High School, Ogden, Utah, received the $100 Government Savings Bond posted as first prize in this year's pepper mill design contest sponsored by the George S. Thompson Corporation.



Berglund used a casting of polyester resin over drapery material to make his first-prize winner (right).

The contest drew entries from schools throughout the United States in response to the firm's efforts to encourage excellence of design in its specific field of quality pepper mills.

Second prize, a $50 bond, went to Richard VanGavres, student at Carlisle High School, Carlisle, Pa. Third prize went to Mike Chavez, student at McKinley Junior-High School, Pasadena, Calif. Duplicate awards were made to the students' instructors.

For more complete information about the

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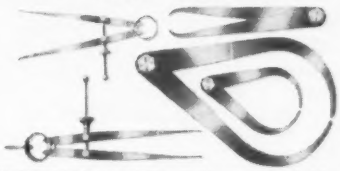

SHEFFIELD STEEL Calipers & Dividers . . . new 5-piece set includes 4", 6", and 8" firm joint Outside Calipers; 6" spring joint Inside Calipers, and 7" spring joint Dividers. Calipers and dividers have many uses and should be in every craftsman's tool box. Sold in sets only. Postpaid.

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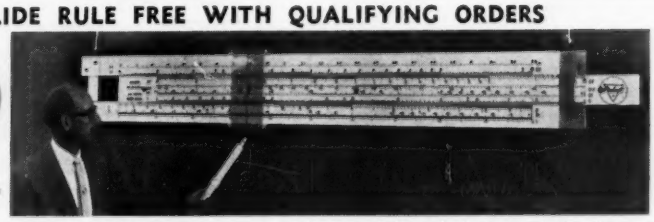

Duplicating the Pickett Slide Rules approved for your classrooms are two Demonstrator Model sizes. They are FREE with these qualifying orders:
See your Pickett supplier or write.

7-ft. Demonstrator with 24 or more N1010, N1011, any Log Log and all-metal pocket size Slide Rules.
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PICKETT All-American SLIDE RULES, 542 South Dearborn Street, Chicago 5, Illinois

contest write to the firm at Monterey Park, Calif., mentioning SCHOOL SHOP; or *circle no. S-7 on the business-reply card.*

Gold Products Introduces Combination Tube Tester and Volt-Ohm Meter

A new Home-"N"-Shop combination tube tester and volt-ohm meter, designed to fill the need for quick, complete check-up, was recently announced by Gold Products, Incorporated, a division of Sencore, Incorporated.

The Home-"N"-Shop tester will check approximately 2000 tubes for emission, shorts, and leakage; these cover all popular hi-fi, TV, and radio tubes, including five star and foreign import. With a flip of the function switch the instrument becomes a handy volt-ohm meter for testing circuits, the company claims.

Voltmeter ranges are 0 to 12 volts for transistor radio and auto radio work; 0 to 120 for household and appliance testing; and 0 to 1200 for TV, radio, and hi-fi sets, according to the manufacturer.

For additional information write to the firm at 500 S. Westgate Drive, Addison, Ill., mentioning SCHOOL SHOP; or *circle no. S-8 on the business-reply card.*

Belsaw Machinery Company Introduces Portable Dust Blower

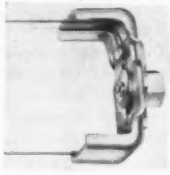
A new portable Dust Blower featuring a hood that attaches to a woodworking machine and moves sawdust and shavings through a flexible hose to a waste container has been placed on the market by the Belsaw Machinery Company.

The Dust Blower is equipped with a paddle wheel fan that provides the necessary powerful suction, is powered by a ¼-hp motor, and weighs 45 pounds, the company reports.

For complete information write to the company, 315 Westport Road, Kansas City, Mo., mentioning SCHOOL SHOP; or *circle no. S-9 on the business-reply card.*

New Oil Filter Removal Tool Added to Proto Tool Line

A new self-readjusting, self-relocking tool designed for quick removal of disposable oil filters has been placed on the market by the Proto Tool Company.



The tool overcomes the difficulty encountered in removing stubborn filters even in those models where the filter is surrounded by other components, the company reports.

The filter tool may be used with a 1" socket and extension, a 1" end wrench, or adjustable wrench. It is adjustable to fit all domestic autos and many foreign models. The tool eliminates the necessity of approaching from the side in the case of frozen filters, and permits neat, safe, and quick removal, according to the company.

For more information write to the firm, 2209 Santa Fe Ave., Los Angeles, Calif., mentioning SCHOOL SHOP; or *circle no. S-10 on the business-reply card.*

New Engraver and Special Kit for Schools Announced by Mico

A new pantograph engraver developed especially for multiline engraving work on large-size desk and door signs is now available from the Mico Instrument Company.

New features of the machine are improved copy-carriers, adjustable work-holding fence, constant depth attachment, and carbide-tipped, tapered-shank cutters. These improvements permit engraving over greater areas with fewer set-ups of the work and master copy, the company claims.

The firm is also offering a kit for engraving a single line of characters on pins or identification badges. The kit has been prepared espe-

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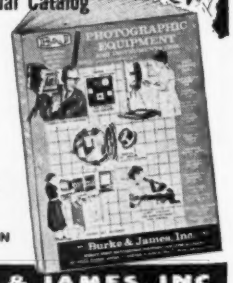

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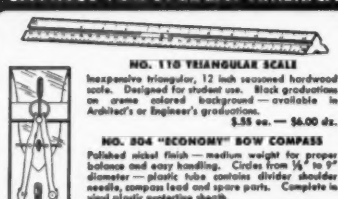

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cially to meet the needs of schools and similar institutions, the company reports.

For more information write to the company, 80 Trowbridge St., Cambridge 38, Mass., mentioning SCHOOL SHOP; or *circle no. S-11 on the business-reply card.*

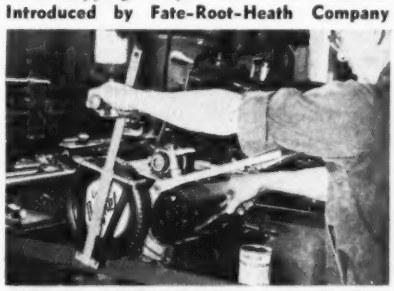
Tool-Room Copying Lathe Announced by REM Sales

With their appointment as national sales representatives for Harrison lathes, REM Sales, Inc., a subsidiary of the Robert E. Morris Co., introduced a new 12" combination tool-room and copying lathe that features an optional tracing unit built into the rear of the machine. The tracing unit permits normal lathe operation or, after turning the desired template, the copying unit can be engaged for immediate quantity reproduction, the firm reports.

The new lathes are manufactured by T. S. Harrison and Sons, Ltd., in England and are designed for the American market. They offer a wide range of turning speeds up to 2000 rpm, feature end-train gearing enclosed in an oil bath for long life and quiet operation, and are available in two models, 24" or 40" between centers, according to the new distributors.

For additional information write the distributing firm, West Hartford, Conn., mentioning SCHOOL SHOP; or *circle no. S-12 on the business-reply card.*

Hand Lapping Adapter for Power Mowers Introduced by Fate-Root-Heath Company



The Special Products Division of the Fate-Root-Heath Company recently introduced a new "Simplex" adapter for hand lapping the blades of reel-type power mowers.

The adapter clamps to either wheel and is spring loaded to grip the tire. With the mower on a bench, the reel can be cranked backwards while lapping-in the blades. If the mower is on the floor, supported by blocks so that the wheels are free to turn, the adapter can be ratcheted back and forth to turn the reel.

For more information write to the firm,

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FOR QUICK HEAT UP TO
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Melt, soften and form plastics, dry glues and paints quickly, safely . . . NO FLAME.
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Model 12750 — 110 Volt
Other models available with lower temperature ranges
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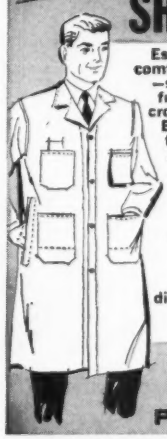

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Plymouth, Ohio, mentioning SCHOOL SHOP; or *circle no. S-13 on the business-reply card.*

New Sports Calendar Offered by Master Lock Company

A new sports events calendar for the 1961-1962 school year is now available from the Master Lock Company.

The new calendar is an illustrated wall chart measuring 18½" by 24¼" with space for recording dates of sports events throughout the school year.

Free to teachers by writing the firm, Dept. W, Milwaukee 45, Wis., mentioning SCHOOL SHOP; or *circle no. S-14 on the business-reply card.*

New Literature:

Accumulative Expenses and **Expense Tally Sheets** are sample bookkeeping forms designed especially for the small service-repair man who combines his shop and home in one location. Offered as a free service by the American Crayon Company, manufacturers of Prang Colors, the materials may be obtained by writing the firm, Sandusky, Ohio, mentioning SCHOOL SHOP; or *circle no. S-15 on the business-reply card.*

Washington . . . . . *from page 78*

enacted, they will change the nature of vocational education because their purpose is a vast national effort to train or retrain the unemployed and underemployed.

Under the bills, state employment services would test, counsel, and select trainees, who would receive stipends while training. Vocational education would be provided by state and local agencies, after which the employment service would make placements and do follow-up studies. As it is now written, this legislation would be effective for four years. In the first year, funds could not exceed $100 million but they could be as much as $200 million annually for the following three years.

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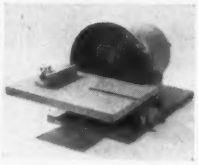

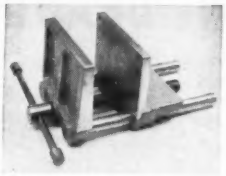

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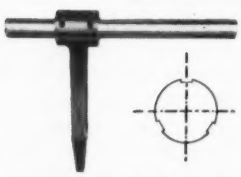

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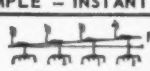
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representing the industrial-arts division of the American Vocational Association. According to the AIAA's executive secretary, Kenneth E. Dawson, there has been so little interest on the part of the AIAA membership in discussing the possibilities of consolidating the AIAA and AVA that the executive committee did not feel justified in appointing an exploratory committee. Mr. Dawson also indicated that exhibitors have told AIAA officials they did not consider it burdensome to exhibit at national meetings of the two organizations and their state counterparts.

The idea of amalgamation of AIAA and AVA, perhaps preceded by holding joint conventions, was first put forward in the February 1961 issue of SCHOOL SHOP by the immediate past presidents of the two organizations, M. Ray Karnes, professor of higher education, University of Illinois, and H. H. London, professor of industrial education, University of Missouri. M. D. Mobley, executive director of the AVA, emphasized his organization's readiness to discuss amalgamation whenever AIAA was interested.

Decline of Craftsmanship?—Tourists to Washington have been flocking to see the hand-crafted projects made by industrial-arts students in competition for prize awards in the Industrial Arts Awards Program, which is being sponsored for the first time this year by the American Industrial Arts Association, a department of the National Education Association. The first-prize winners in 20 categories are on display, with 130 other competing exhibits, at the National Housing Center, the headquarters of the National Association of Home Builders, which naturally takes considerable interest in encouraging high standards of craftsmanship.

The Center is normally a prime tourist attraction because of several floors of product exhibits of interest to homeowners, but crowds were heavier than usual around the work of the junior-high and senior-high-school students—hi-fi cabinets, architectural drawings, a three-quarter scale antique auto that can be driven, hand-tooled leather, articles of plastic and ceramics, etc. "The professional flair with which these young people have executed their ideas reflects encouraging characteristics in a large segment of this nation's youth," the National Housing Center announced in welcoming the Industrial-Arts Awards Programs. "Alert production managers would do well to visit this exhibition and scout a new generation of talent." ★

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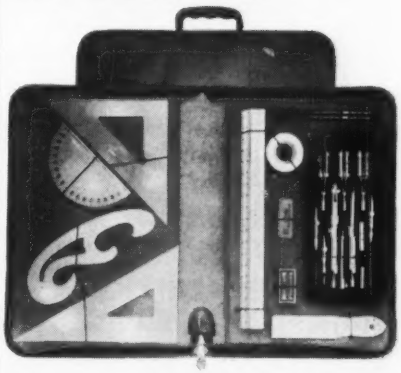

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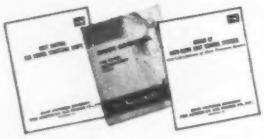

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Surprise Retirement.—Two years before the scheduled date, James H. Pearson suddenly decided to retire as Director of the Division of Vocational Education of the U.S. Office of Education. Mr. Pearson, who was an assistant commissioner of education, informed Commissioner Sterling M. McMurrin on a Thursday that he was leaving, and the paperwork was wound up by the close of business on the following Monday (July 31).

Mr. Pearson will continue to reside in the Virginia suburbs of the Nation's Capital, where he plans to complete a book, do some other writing, and serve as a consultant in vocational education.

"During Mr. Pearson's more than 30 years of leadership in the Office of Education, he has contributed immeasurably to the advancement of education in general and vocational education in particular," Commissioner McMurrin wrote in a circular letter informing state educational officials. Among Mr. Pearson's more recent honors were the HEW Department's Superior Service Award received in 1955 and service as an Adviser to the International Labor Organization Conference in Geneva in 1956.

The acting director of the Vocational Education Division is Walter M. Arnold, who was previously director of the area vocational-education branch. From 1954 to 1959, Dr. Arnold was director and executive officer for the Kansas State Board of Vocational Education. Previously he was State Supervisor of Trade and Industrial Education with the Oklahoma State Board of Vocational Education.

Dr. Arnold's professional experience started in Pennsylvania, where he was director of vocational education in Allentown, Superintendent of the Stevens Trade School in Lancaster, and an instructor of related subjects in the Lancaster schools.

Dr. Arnold joined the U. S. Office of Education less than two years ago. Among the activities of the Vocational Education Division to which he has given leadership was the preparation, after more than a year's study, of the USOE report, *Vocational Education in the Next Decade,* which proposed a doubling of total expenditures for vocational education by 1970.

Legislative Outlook.—The prospects for school legislation are not as bleak at this writing as they appeared shortly after the House Rules Committee surprisingly voted 8-7 to bottle up, not only the bill for grants to the states for school construction and teachers' salaries, but also a bill proposing classroom construction grants for the colleges and an extension of the NDEA. The college-aid bill and continuation of the NDEA were considered noncontroversial and certain of passage, but they were caught in the political currents swirling about the bill calling for massive federal aid to the elementary and secondary schools.

When the Rules Committee killed these three bills, however, they also ended one of the most popular forms of federal aid, the construction and operating grants to "impacted areas," school districts burdened with a large number of children whose parents work for Uncle Sam. The program was due to end on June 30, so the Kennedy Administration made extension of "impacted-area" aid a part of its general federal-aid bill. This novel packaging is what will probably enact some school legislation this year (perhaps by the time this appears in print), despite the Rules Committee.

Congressional leaders are talking in terms of one bill which would include grants to states for school construction only, extension of the "impacted-areas" aid, and continuation of the NDEA as it is now on the books, without adding the proposed loans to private schools for construction of certain kinds of classrooms. This combination should provoke a minimum of opposition because of the importance of continuing the "impacted-areas" aid, which is a vital factor to 3,800 school districts located in 319 Congressional districts, more than enough to enact the whole package.

Amid the maneuvers to enact these highly publicized measures, another bill of more direct interest to vocational education was sailing through Congress without difficulty. The Senate and House committees dealing with education both approved identical bills proposed by President Kennedy for occupational training and manpower development. If

(*Continued on page* 74)

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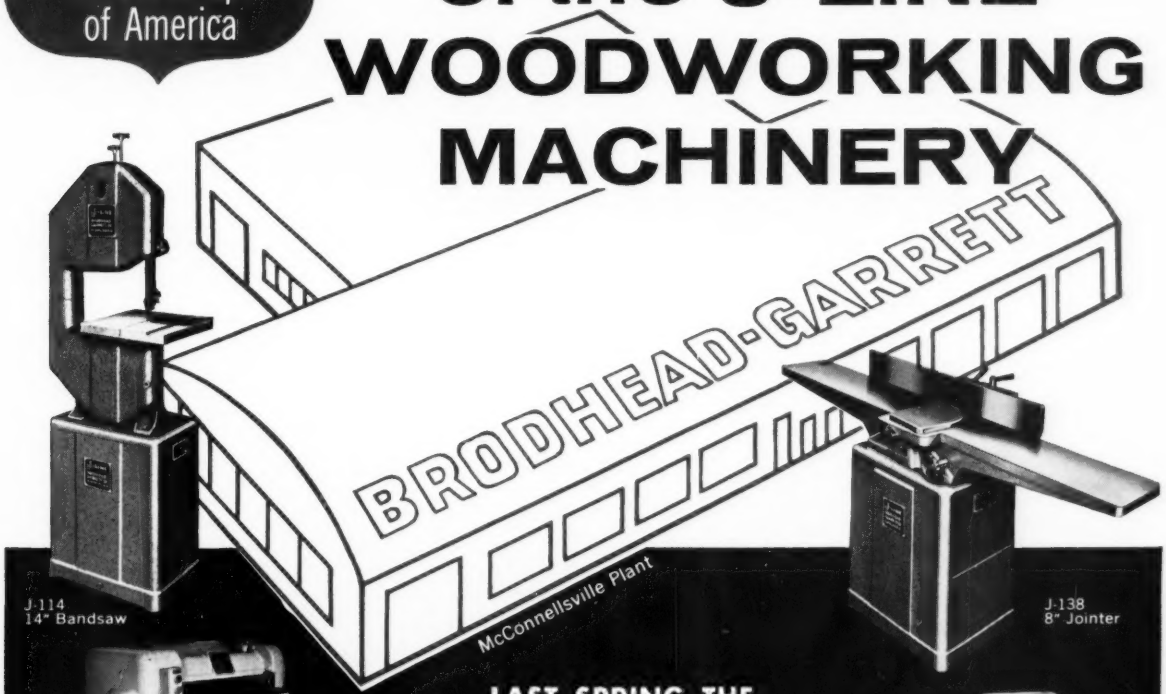

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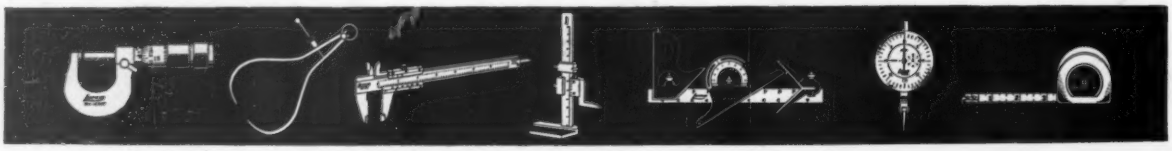
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